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THE INDUSTRIAL ARTS MAGAZINE

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INSTRUCTION SHEETS AND THE PRINCIPLES OF TEACHING

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THE RESULT OF our attempts to solve difficulties of shop instruction has not been gratifying because of the complexity of problems involved in classroom readjustments. Oral group instruction impeded by problems of individual differences, irregularity of progress in pupils, inability of pupils to retain information from the time of reception to the time of application, and the necessity for frequent repetition of demonstrations, brought about a general response to the idea of individual oral instruction. Individual oral instruction appeared to offer some solution of the problems, but the difficulties only increased because the method added greatly to the labors of the teacher. The theory of individual instruction was sound but to rely on it entirely was impracticable. If instruction could be brought separately to each pupil, thus allowing unrestricted individual progress, many difficulties, and more especially the important one of individual differences would be solved. In an attempt to solve this problem many forms of written instruction sheets have appeared. These sheets are passed out to the individual pupil and are used to supplement oral instruction or to displace it entirely.

The term "instruction sheet" is generally applied to any of the various forms of written instructions. Job sheets, operation sheets, information sheets, and assignment sheets are only special forms of the instruction sheet. The characteristics of these various types are different and it is important that they should not be confused. All instruction sheets are for instructional purposes, but some are not as adaptable as others. Job sheets of various kinds are the outcome of trade analysis in industry and as such are based on jobs. In industry the job is a production unit and may contain a number of operations. These operations are the processes which a worker must know and be able to do in order to be efficient. These operations may vary in number in each job and the same operations may be used on many jobs. Writers of job sheets based on trade analysis do not consider the operations as instruction units, but they follow the scheme of industry and use the production unit or job as an instruction unit. A separate instruction sheet is required for each job.

Operation sheets, information sheets and assignment sheets are an outcome of trade analysis based upon operations as the instruction units. Since jobs are composed of operations and since the operations must be known and done by the workman in order to do the jobs, it is assumed that the logical procedure would be to use the operations as units of instruction and these operations may then be used as they occur in any job. Writers of operation and information sheets recognize the operations as instruction units.

Disappointments have resulted from the attempts to solve the instruction difficulties with some forms of individual sheets. Both teachers and learners have been disappointed in the results of their efforts to use some of the poorly thought-out and hurriedly written forms that appeared on the market, and the use of instruction sheets has been abandoned in some school systems.

Let us consider the reasons for these disappointments. The possibility of written instructions supplementary to oral instructions seems to be worthy of consideration. Behind every failure in teaching there is obviously a cause, and the cause is often fundamental. Very often when oral or written lessons have not been effectively put over, the fundamental causes may be violations of important factors in learning and presenting subject matter effectively.

Some time during the period of teacher training in any organized program for that purpose, studies and applications are made of certain phases of psychology and methods that are particularly applicable in teaching. They are principles of teaching and are concerned with learning; they provide a foundation for the teacher's behavior in preparing and putting over subject matter. In many cases these factors have not been taken seriously. As a whole they represent what authorities in education recognize as a very necessary part of the fundamental training of a teacher. It is further recognized that this fundamental training should be specific and applicable. These principles of teaching should be followed; when learned well they become a means of control for obtaining good results. The teacher need not consciously refer to them but they become a habit. They are a basis for tact.

The uncertain success of written forms of instruction can be traced to this very fundamental cause. Facts in learning contributed by method based on psychology have often been misunderstood or disregarded entirely.

Reasoning and Solving Problems

Let us consider some of these factors of difficulty and begin with the reasoning and solving of problems. When reasoning, we depend upon previous ideas and facts for solution of problems. No one can reason out a difficulty without that well known apperceptive basis. We must first know

something about the "how" of the "doing" in a problem, based upon past experience with similar difficulties, before we can project a solution. A learner in soldering must first be able to solder before being told to "apply solder with soldering copper." Likewise, a learner in woodwork needs to know how to cut a mortise-and-tenon joint before being told to "make a mortise-and-tenon joint." Stating in an instruction sheet directions of this sort is presupposing a contact with the same situations some time in the past. If a pupil had already been taught how to solder or how to cut a mortise-and-tenon joint, he would have the apperceptive basis necessary to reason out a new situation involving these processes. If he has not been taught how to solder or how to cut a mortise-and-tenon joint, he would not have the apperceptive basis that is necessary to carry out a direction or instruction such as "apply solder with soldering copper" or "to make a mortise-and-tenon joint." In teaching the beginning of any art or science it is necessary to pass on to the pupil the things which are fundamental and which have been gained by race experience in that art or science. The pupil does not know; he needs to learn these things so that he can reason for the solution of future problems involving the learned processes.

Methods

In the above instance, the method of inductive teaching has been misused. In inductive teaching a problem is stated and a solution is sought. This is highly desirable in advanced work, but it is not entirely satisfactory in beginning work. In deductive teaching it is required that facts be told and operations be performed and imitated by the learner. It is an accepted fact that this creates lazy minds; that is quite true. In inductive teaching for beginners an apperceptive basis for reasoning out a new and strange situation is missing, which makes impossible the solution of a problem of which he knows nothing. Our problem in teaching new learners is deductive and inductive teaching combined. We must show them how; pass on the fundamental things that have been gained by experience, and at the same time get them to think. In an instruction sheet for beginners it would be well to tell how to apply solder with a copper and to give details concerning flux, and which to use for the situation. A question or two relative to the actual doing of the operation might be inserted in space at the end of the sheet.

One type of instruction sheet bases the instruction on questions only. This is strictly inductive. There is never a time when inductive teaching can function entirely alone. How can one learn by being asked how to do an operation, and then be expected to go to a bench to probably do it by trial and error? If it is a new operation one must be shown how to do it; and made to think while doing it by being held responsible for answering questions dealing with why things are done in a certain way and also for the successful performance of the operation. All human beings are different, but essentially alike in one important respect. When a problem is presented for solution, a means of solving that problem must be attained. If we are not successful we soon stop trying. Success is productive of thinking and creates possibilities for further success; that is the resulting satisfaction so highly desired in a teaching situation. Attempting to teach by asking questions only and expecting trial and error to bring results is discouraging. It would be vastly better to explain how each step should be done. The explanation of each step should be thorough and complete, especially for new learners. They will have considerable reasoning to do while planning their procedure and understanding the instructions both oral and written. The application, and association of the directions with the application, is thought provoking enough and would be sufficiently inductive for a learner. Questions to be answered after the solution of the problem suggests further material for reasoning.

Correlation

Another difficulty encountered in the use of some of the available instruction sheets is the quantity of extraneous material put into that part suggested as "directions for making." The directions for making often are quite inadequate, and further difficulty is added by inserting related information which has a confusing tendency such as we have encountered in attempting correlation. The fact that two subjects cannot be well taught together is conceded by most educators. One subject will give way in its content to the content of the other subject. Likewise, when certain operations are to be explained, confusion will take place by inserting so-called related information such as kinds of material, reasons for doing, or an historical point. We must avoid attempted correlation when there is possibility of confusion. The part of an instruction sheet given over to instruction for doing should contain that only. It would be well to put other worth while related information in a special place, even if necessary to use an extra sheet. The matter of extraneous material should be seriously thought out as instruction sheets are quite abstract at their best, and in order to be effective the related matter should be carefully considered before it is inserted and then it should be emphasized. We must make these instruction sheets as clear as possible.

Doctrine of Discipline and Instruction Sheets

To the extent that there are identical elements, educators agree that a carry-over takes place between subjects; and further, a carry-over should take place between the learning and the doing, and from the beginning operations to advanced operations. And even more important, we must teach so there is a carry-over from the school into the outside world. One reason for adding job sheets to class instruction is to aid in this carry-over; to strengthen and assist regular oral classroom instruction. The fact that this excellent form of supplementary instruction has been abused has resulted in many of our disappointments. The instructor has become dependent upon the instruction sheet in many cases and teaching has not taken place. Instruction sheets should not be used to displace the instructor nor to ease up on the instructor's job. They were designed to make more efficient his own efforts to meet the individual needs and progress of the class.

The organization of material for instruction sheets by the method of asking questions, thus attempting induction, is certainly not teaching so there is a carry-over. There must be fundamental skills and information carried over by beginners into advanced work, and further, the advanced work must carry over into world activity. Giving vague directions and inserting extraneous related material is similarly violating accepted theories of teaching. It leads us to the important factor of interest and effort.

Interest and Effort

Interest has always been a problem for instructors, and it has been difficult to determine just where the interest should be. Should interest be such that the pupils' fancies be satisfied? Should the interest be one of intrinsic desire to solve a difficulty? Solving difficulties and reasoning are similar and, as before stated, when difficulties remain unsolved we are all prone to stop trying. Can interest and effort be so closely related that it is difficult to determine which dominates a situation? Here is one of the outstanding problems in all branches of teaching. Certainly it must be true that interest

and effort are essential in the personal development of any individual. In fact, we may go further and include all human development.

Society, through the school and the teacher, determines what shall be taught; for that reason we cannot readily separate interest and effort. Society determines that constructive methods based upon the best race experience should be handed down to the individuals in whatever training they shall undergo. This means that we must not make the mistake of expecting the pupils to determine what shall be taught. They certainly do not have the experience nor have they inherent within them a knowledge of the better methods of construction and the scientific principles that have been gained by race experience. If they did, schools would be unnecessary.

The course of study should be reasonably well fixed, allowing a certain amount of choice by the individual, keeping in mind that instruction is the objective and not the satisfaction of individual fancy. The project is not so important as what is to be taught. One of the larger factors in this continuous process of human development is the teacher. The fact that the teacher has been confronted with the problem of maintaining interest and effort so frequently, and that it still remains a question in classroom conduct, brings about further need for individual attention.

Now to what extent can the instruction sheet be of assistance in a situation involving interest and effort? Expecting learners to solve problems in shop work by asking a few questions is assuming that race experience is inherent in them and that instruction is unnecessary. This is a trial-and-error method which has been one of the most wasteful and discouraging of all methods. The type of instruction sheets containing vague directions and extraneous material throws interest and effort into a further state of confusion. Success is necessary for continued interest. Vague directions have a tendency to draw the pupil into an expectancy and suddenly bring him into disappointment because the real instructions are not there. They are assumed to be there but the learner, by trial and error, discovers that something is missing. Interest wanes and soon effort ceases. Extraneous material throws him into further confusion. Instruction sheets should be of assistance to an instructor and not a hindrance; they become the best aids for shop instructors when the spirit of interest and effort can be kept alive for the reception of that important phase, the personal attention of the instructor. That is the highest state to which we can bring individual instruction in shop work. Well written instruction sheets and a good instructor should be a splendid combination in the personal development of an individual so far as shop is concerned.

It can be readily seen that reasoning and solving problems based on apperception, correlation, doctrine of discipline, and interest and effort are really important factors in classroom instruction, and that those entrusted with the personal development of the individual, as far as school is concerned, should be familiar with these factors. It should be unnecessary to go more into detail with each, using illustrations and pointing out exact cases. Instructors familiar with the principles of teaching who have been using instruction sheets of various kinds and who have encountered difficulties can readily provide the experience necessary; they have been many. Any further illustrations used here would be a small fraction of the cases brought to mind by a criticism of instruction sheets that might be read by interested teachers.

The Instruction Sheet

If instruction sheets are to be an important supplement to oral instruction, they must contain all the information necessary to solve the problem. By solving problems, of course, we mean instructional cases whether in the making of a shop project or in a drawing. It is the task assigned that contains the information which society requires the individual shall learn. Detailed instructions should be supplemented with drawings and illustrations showing as near as possible each step that cannot be thoroughly explained by writing. One might assume that this method is too deductive, that we are telling too much, that we will produce lazy minds. But let us remember that part of our duty as teachers is to pass on the things that have been gained by experience, especially for beginners. Coordinating execution and interpretation of the instructions will provide for developing ability to reason in shop work. Placing a few well directed questions at the end of the instructions covering vital points will add further material for reasoning. These questions should be carefully considered, since questions can often lead to a confusion in carry-over of subject matter into subsequent use. Professor Selvidge in his "Trade Analysis" suggests that learners be required to analyze their jobs from the unit instruction sheets. He suggests that the instruction sheets be complete and that the learner take these and organize his procedure for the approval of the instructor. This is placing the induction, or thought provoking phase of teaching, at a desirable place. The learner, whether a beginner or advanced, has an opportunity to read carefully instructions for learning, and then he has an opportunity to think out his plan of procedure with the assistance always, of course, of the instructor. We must not leave out the instructor as a part of any situation even when using written forms of instruction.

A list of references is often added to instruction sheets and it is important in the broadening of experiences for a learner. These references should be immediately available and each reference should indicate the specific page. Learners, and even teachers, are not inclined to hunt through books for reference material. This is another step in upkeep of interest and effort. We need to keep the spirit of interest and effort alive in teaching and problems too difficult to be solved do not bring about the resulting satisfaction that is necessary for success. Assigning of references in a general way is convenient, but very difficult to follow even for an adult. It is research, and beginners have not sufficiently acquired an apperceptive basis for it. Assigning of reference material in any case should be carefully thought out. There are times when it is unnecessary and may become extraneous. When, because of the extent of the problem, the treatment is incomplete, it becomes necessary to add references; however, they should be added only when needed to clear up matters not adequately treated in the instruction sheet.

The Instructor

The importance of the instructor in a teaching situation cannot be over-emphasized. So long as a pupil learns economically by himself the instructor is not needed; but those situations are rare indeed, especially in shop work where both skill and reasoning are important factors. When a pupil does need attention the instructor should be there to render every assistance possible in determining the difficulty and to help in overcoming it. As previously stated, a common fault in the use of written instructions has been to eliminate in part, or entirely, the instructor; this has been done in most cases by the instructor himself. Again it may be well to state that instruction sheets cannot and never have been intended to displace him. They were intended to supplement and make more and more effective his work as an instructor. If it is used to dispense "canned information" or to permit untrained persons to keep class it will result in disappointment.

The two important phases of class instruction are the demonstration and the follow-up work. The demonstration is to show by actual performance the proper use of tools and methods of construction. This may be accomplished in three ways:

1. The demonstration in which the instructor performs all execution and depends solely upon his own ability without instruction sheets or lesson plan.

2. The demonstration in which the instructor performs all execution but orients it with the instruction sheets as read by one of the pupils or as read by himself.

3. The demonstration in which the pupil takes part while directions are read to him by another.

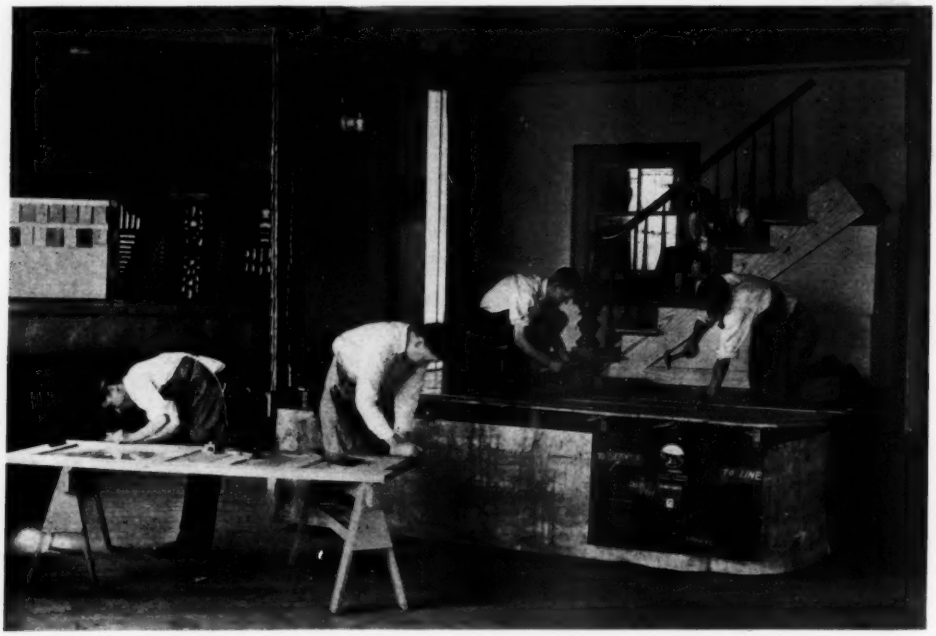
If all pupils made uniform achievement, one of the problems of individual differences would not exist. Group demonstrations would suffice for all instruction. Since we are not blessed with such a satisfactory situation, we must depend upon individual instruction to a greater or lesser degree after the initial or beginning demonstration. The initial or beginning demonstration is the only one in which the first method is effective. After that, the group becomes separated in achievement and group demonstrations are of little value. The results are obvious. Supplementary problems are often used in keeping the class together and those who really need additional practice on the same problem—the slower pupils—do not get it. The extra drill is always given to the more rapid pupils in the class. As a result these pupils are held back. We retrogress them instead of progress them.

The use of the instruction sheet aids materially in the individual progress. It serves to assist and to supplement the work of the instructor as he divides his time as economically as possible among individuals of the class. It is possible for the instructor to give instruction where it is needed and when it is needed. Our difficulties begin after the initial demonstration when individual attention and instruction are needed.

The second method mentioned above serves well in subsequent demonstrations. An orientation is provided by the instruction sheet and the demonstration. If for any reason the instructions given in the demonstration are not applied, a slight study of the instruction sheet by the pupil serves as an excellent recall and visualization of the demonstration. As the work advances and fundamentals are well mastered, the third method becomes very effective. The demonstration in the first method is deductive; as such, it is imitative. By gradually proceeding in order with two and three the work becomes more and more inductive. More responsibility is placed upon the pupils and the possibility of carry-over is greater. The more advanced students could also be given further training by assisting slower pupils in the interpretation of the instruction sheets.

These two methods are logical steps of procedure for using instruction sheets in shops of one or more representative industries. In varied industry shops, such as home mechanics, a similar procedure will function with smaller groups who are working on similar problems. The importance of clearly and carefully written instruction sheets for home mechanics needs emphasis because individual instruction is made necessary by a variety of activities. A well written sheet becomes indispensable; a poorly written one becomes a detriment.

In conclusion, instruction sheets based upon the principles of teaching are essential in shop practice. So long as individual differences exist, the problem of individual instruction on efficient basis will confront the shop instructor. Because he cannot give attention to all individuals at one time, the instruction sheet seems to be the best supplementary form of instruction for him. Our practice must follow the sound and well established principles of education. As shop teachers we cannot ignore the fact that the process of learning is similar in all fields of endeavor. We have been entrusted with the duty of passing on through the race the best in industrial instruction that society can give; we cannot leave much to trial and error; we must deal with the problem and contribute what this generation has to offer for the next. Undoubtedly the instruction sheet will help us if properly written and wisely used.



CLASS IN ARCHITECTURE AT THE WAITE HIGH SCHOOL, TOLEDO, ERECTING SECTION OF A HOUSE INVOLVING TYPICAL CONSTRUCTION.

THE STUDY OF ARCHITECTURE IN HIGH SCHOOLS

A. M. Youngquist, Waite High School, Toledo, Ohio

ALMOST EVERY OUTLINE of instruction in industrial arts includes mechanical machine drawing and comparatively few include a practical and comprehensive study of architecture. Keeping in mind the objectives of industrial arts, i. e., to develop mechanical aptitude and intelligence with a view to better fitting the student for the general duties and pleasures of life, particularly in and about the home; to give contact and experience with a variety of tools, materials, and processes with a view to industrial insight;

OUTSIDE SECTION OF A HOUSE AT WAITE HIGH SCHOOL.

to train students to be exact and fertile thinkers; and to aid and direct them in discovering their occupational tendencies, capacities, and aptitudes—it is the author's opinion that more emphasis should be given to architecture. Every man, no matter what his vocation, will some day rent, build, buy, or repair—probably all of these—a home, and will be greatly benefited by a knowledge of building construction, costs, and design. While it is generally understood that the objective of industrial arts is not that of specific trade training, fortunately it often functions as such, and the building trades offer a wide vocational field.

The historic, artistic, and economic phases of architecture as applied to home building, represent tremendous possibilities in training both boys and girls. There is a wave of sentiment today for more comfortable, more beautiful, and more economical homes. This is typified by the "Better Homes in America" movement, and the men in this movement have done much in an educational way. President Coolidge writes on the subject, "The American home is the foundation of our national and individual well being. Its steady improvement is, at the same time, a test of our civilization and of our ideals. The building, ornamenting, and owning of private homes by the people at large should be encouraged in every community. We need attractive, worthy, permanent homes that lighten the burden of housekeeping. We need homes in which home life can reach its finest levels, and in which can be reared happy children and upright citizens." John Ruskin says, "I would have our ordinary dwelling houses built to last and built to be lovely; as rich and full of pleasantness as may be, within and without. When we build, let us think that we build forever. Let it not be for the present life nor for present use alone."

The development of our civilization demands that we give the younger generation training for home-making, the most universal of occupations. For many their home is the one great expression of themselves, their individuality, their personality, their ideals, and their aspirations. Should not schools guide, direct, inspire, and train students for better home building and maintenance?

The study of architecture can be made to fulfill the objectives set up as well as any other subject offered in industrial arts. From my observation and investigation of the activities of former high school graduates this training has functioned in a vocational way fully as often and as well as that of machine shop practice, auto mechanics, pattern-making, and cabinetmaking, and for the activities of life outside of one's vocation better than any other.

What does a practical and comprehensive course in architecture for high schools include? First, it must be remembered that architecture is a study as well as a laboratory exercise, in fact, more time should be spent on the study as compared to the laboratory work than in any other industrial arts subject. The work may be divided roughly as follows:

CLASS IN ARCHITECTURE AT WAITE HIGH SCHOOL.

Construction details, specialties, design and planning, working drawings and specifications, financing and estimating, and building.

The work under the author's direction at Waite High School begins with drawing of details of good construction,

which is supplemented by a text, lectures, and demonstrations from which the student becomes familiar with modern construction practice, materials, and their relative merits and costs. Building today involves a wider knowledge and there is a greater range of alternatives to choose from than ever before, especially in materials. New materials and devices are constantly becoming available and should be given as much thought and consideration as the style of architecture and the arrangement of the rooms. Upon the material used and the quality of construction depend to a large extent the beauty, the permanence, the comfort, and the lasting satisfaction of a home.

A logical sequence of the study of construction details is as follows: Foundations, framing, floors, wall coverings, cornices and roofs, windows and doors and their frames, stairways, fireplace, built-in furniture, and special front entrances. Incidental to the study of the above must be given the architectural conventions, lettering, and a study of interior trim and moldings. It is essential that a large and up-to-date library be kept of business literature and samples for reference, which in most cases may be had for the asking.

Course II is a practical application in the shops of as much as possible of the material presented in Course I, building details. The photographs show a section of a house being built at Waite High School, which includes part of the foundation, sill construction, balloon framing, sheathing, siding, basement sash and frame, window, door and frames, lathing and plastering, rough and finish flooring, interior trim, stair construction, painting and finishing, hardware installation, some heating ducts and registers, some sheet metal, some electric wiring for lights and door bell. This is about as much as is possible to give in the time allotted for it. Cornice construction and some application of plumbing might well be added to this course if time permits.

In some cases the practical application may take the form of actual construction of a garage or even of a complete dwelling, particularly that of a demonstration or practice home which some of our schools are featuring for the use of domestic or household arts classes. It may be remarked here that the school practice house for the teaching of home economics is a progressive idea which will undoubtedly lead to the replacement wherever possible of the formal home economics classroom in the main building.

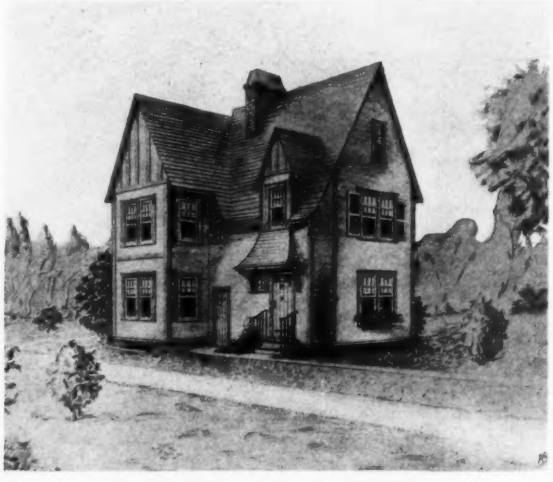
The term "specialties" is used, for the lack of a better word, to include masonry, plumbing, heating, ventilating, painting, and finishing, electric wiring, and hardware installation, which are often given too little time and study.

The Nineteenth Century was an age of rapid progress and expansion and in the demand for quantity there was little time for the development and refinement of the "specialties". They have now come into their own and craftsmanship has awakened to its responsibility. New creations, designs, methods, and economies have all but revolutionized the comfort, beauty, dignity, and leisure possible in a modern home. The study of the specialties is begun in Course I, given some application in Course II, and continued in Course III and IV, together with Planning and Design, and the beginning of Working Drawings. The divisions must of necessity overlap.

In Planning and Design we find perhaps the greatest field for general education as well as for self expression. First, the general rules of form and proportion as applied to mass and divisions of mass are given. Texture and surface enrichment must be worked out in materials and details.

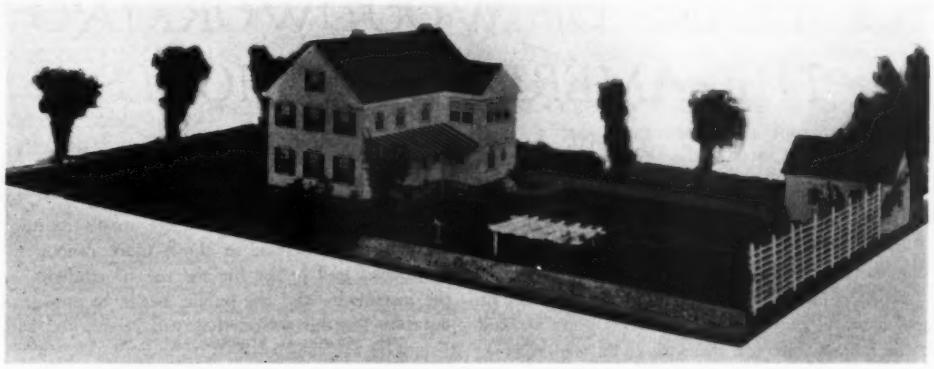
The historic aspect is given some study and the five classic Orders of Architecture are drawn and their applications to modern architecture is illustrated. Time is spent in studying English, French, Italian, Spanish, and our own American styles of domestic architecture, and reasons why those styles have evolved are emphasized. Our dwellings are all adaptations of some type or style such as the English, Colonial, Spanish, etc., and everyone should know the general distinguishing characteristics of each. The student of architecture should know the more minute details of each as well, such as in the cornice construction, fireplace detail, materials used, etc. Students are urged to make sketches outside of school of details and effects that are good, and the class accompanied by the instructor, makes visits of inspection to houses under construction, and demonstration homes. Toledo's recent demonstration during "Better Homes Week" of five new furnished homes was very instructive and interesting to the students. A drive through the newer and better suburbs of any of our cities is an inspiration and can be made an excellent means of illustrating and testing the students' knowledge of home styles. The new types of dwellings, new color schemes, new effects in design, new effects in material texture, and withal the beauty and dignity achieved without sacrifice of practicability and economy may well be said to be the American Renaissance in domestic architecture and as such should be a subject of study in our schools.

In planning, the plot and landscape gardening must be considered. This is done by a plot plan and shaded perspective drawing, or by a scale model. The cut shows the pictorial drawing and model of a colonial house developed in the classes at Waite high school. The design is original, and complete detailed drawings are made from which the model is made accurately to a scale of ¼"=1 ft.



STUDENT'S PERSPECTIVE DRAWING.

The platform for the groundwork of the model is ¾" pine with the curb and roadway cut in. The terraced or raised lawn is ½" pine with areaways for basement windows cut in. The lawn is a green crepe paper pasted on. Japanese grass cloth with fine sawdust dyed to a correct green spread over to a depth of about ¼" makes an excellent lawn. Modeling clay may be used for any marked variations in the topography of the lot. The boxes or frames for the house and garage are made of plywood. The siding, windows, doors, and front entrance are drawn in elevation on white paper, tinted for color where necessary and glued onto the



MODEL HOUSE MADE BY A STUDENT.

wood frame. The shutters are green cardboard glued on. The roof is a rough cardboard with shingle lines drawn on and tinted green for color. The cornice is scored wood which is a close imitation of the design. The awning is painted paper, the walks, drive, and curb are painted cement color and the roadway the color of macadam. The hedge and trees are a hat-trimming product purchased at a five-and-ten-cent store and make an excellent material for the purpose. For temporary model exhibits, moss and actual small shrub branches for trees and hedges may be used. Sheet moss sewed on cardboard forms makes a good hedge. The flowers are also hat-trimmings. The gravel walks in the rear are sandpaper, the pool is a mirror, the stone hedge is wood covered with coarse sandpaper, on which the stones are painted.

Architectural accessories such as ornamental fences, pergolas, seats, fountains, pools, bird-baths, and sundials add interest to a model and should be made accurately to scale to give the proper effect. Small manikins, toy automobiles, and garden furniture of a proper size may be used to advantage to give scale to the picture.

The interest created among students in building models and the numerous suggestions and materials supplied by them is surprising. For purposes of study and presentation to the lay mind the use of models makes the work *real* and enables the student to visualize what is drawn in plan, elevation, and section. Other plot plans and samples of shaded perspectives are shown.

In planning a house it is most important to consider built-in equipment such as china closets, linen closets, book shelves, window seats, medicine cabinets, ironing boards, breakfast tables, and seats, and household conveniences and labor-saving devices generally. These features add greatly to the sale value and economy in furnishing a home.

Intelligent planning also requires that the placing and arrangement of furniture be anticipated. Adequate wall space must be provided for the larger pieces and electric outlets for dresser, table, and floor lamps can only be located when an arrangement of furniture is made. For this purpose the probable arrangement of furniture is laid out to scale on the floor plans. An isometric section such as the one shown is a great aid in visualizing the arrangement of rooms and furnishings.

In planning a home there are a thousand questions of comfort, convenience, and expense; most of these can be solved by study, forethought and a proper source of information. For supplementary reading, for lecture material, and even as texts, furnishing annuals and building annuals are excellent books, well illustrated and easily understood.

About making working drawings, little need be said here except that they should be complete and conform to modern architectural practice as to conventions and symbols. They should be made with the viewpoint that the house is actually to be built and therefore economy, beauty, and correctness emphasized. A complete set of drawings should include, besides preliminary sketches, basement and flood plans, four elevations, section in elevation, details of sill and cornice construction, front entrance, fireplace, stairway, and interior trim details, plot plan and perspective. Items not selected from standard stock sizes and materials should also be detailed. Outline specifications at least should be made for each house and if time permits more detailed specifications can be made. The phrasing and word content can be made a subject for correction and criticism in the English classes, and arrangements can usually be made to have the typing done by the commercial department classes.

The group plan or combining the efforts of several students in making a complete set of working drawings works well if time is limited. Checking other students' plans is a most important phase of their training as a critical attitude is developed which influences their own plan making. It also gives contact with more types of houses than they could hope to develop themselves.

It is perhaps the most difficult for the student to acquire more than a superficial acquaintance with financing, costs, and estimating. However, some time should be devoted to these subjects in the form of lectures by the instructor and notes should be taken by the students. First and second mortgages, their interest and retirement or amortization, should be explained; the percentage of income to devote to rent or payments on a home; recurring costs such as interest charges, taxes, upkeep and repair, interest on investment, and insurance, should be pointed out.

Methods used in estimating and the comparative costs of materials and types of dwellings can be given. The approximate method of estimating the cost by multiplying the cubic volume by a determined factor for the locality and type of building should be applied to each house.

The vocational possibilities for architects, their duties, fees, and qualifications should be dwelt upon. Notes on building restrictions, fire and tornado hazards, inspection, the contract, the contractor, and the sub-contractor should be given. The student's notebook should be graded and quizzes given at intervals on the subject matter.

Because of the nature of the subject, the study of architecture in our high schools offers a splendid opportunity for originality and inspiration in its presentation and scope. It deserves a greatly extended support.

FIFTY YEARS OF WOODWORKING IN THE AMERICAN SCHOOLS

Paul E. Klein, San Diego, Calif.

(Concluded from January)

Pedagogical Manual Training Movement: Though this designation is chosen arbitrarily, it seems from what evidence is at hand that manual training began by 1903 to take on a "pedagogical" attitude—new claims were made for it—sort of "school teacher" claims. However, the next few years marked the high tide, or golden age, for the subject of woodwork—or "manual training" as it was called.

The models were very strongly influenced by the crafts movement yet, in some localities, the old fussy work continued, or combinations or modifications of both were in evidence. Plate 8 illustrates these. Standard commercial design began to influence the school projects. A great amount of correlation with other subjects was emphasized. The "culture-epoch" theory gave opportunity for the working out of primitive dwellings, tools, utensils, etc. A combination of many other materials with wood was popular. Reeds were woven into seats for the wooden chairs; metal, leather, and cloth were used extensively. Forestry and trees were studied. Tools and processes in other countries and times were investigated. During the years 1906 to 1909 mechanical toys and thin woodwork, cut with the coping saw, became popular. See plate 10.

Practically all schools of any size or with any spirit of progressiveness began to give instruction in manual training or woodwork, and well graded and planned courses of study appeared. It was these carefully and minutely planned courses that suggested the term "pedagogical" being applied to this period. Plate 9 shows portions of such a course.

Faculty psychology was a big factor in influencing the aim of the shop work of this period—manual training trained the reasoning, the powers of observation, strengthened the will, coordinated the hand and the eye, made the pupils better able to handle themselves, to think more concretely and clearly. Textbooks and books for the use of students, as well as for the instructors and the public, began to appear. In the bibliography for this period they will be marked with †.

(24) "Elementary Woodworking," E. W. Foster, 1903.
(25) "The Economics of Manual Training," Roullion, 1905.
†(26) "Elementary Woodwork," Seldon, 1906.
†(27) "Elementary Cabinetwork," Seldon, 1909.
†(28) "Educational Woodwork for School & Home," J. C. Parks, 1908.
†(29) "Beginning Woodwork in Home & School," Van Deuson, 1907.
(30) "Manual Training in the Grades," F. Halstead, 1913.
(31) "Manual Training for the Common Schools," Allen & Cottin, 1910.
(32) "A Shorter Course in Woodwork," C. G. Wheeler, 1911.
†(33) "Woodwork for the Grades," Orr & Lockett Hdwe. Co., 1909.
(34) "Handwork," University of Missouri Bulletin, 1916.
(35) "Drawing & Manual Training Lesson Outlines," bulletin, Boston Schools, 1910.
(36) "Manual Training in Alleghany Public Schools," bulletin, Alleghany Schools, 1910.
†(37) "Essentials of Woodworking," Ira S. Griffith, 1908.
†(38) "Problems in Woodwork," M. W. Murray, 1910.
†(39) "Modern Carpentry," F. T. Hodgson, 1906.
(40) "Coping Saw Work," Ben Johnson.
(41) "Bulletin," St. Louis Manual Training School, 1899-1900.
†(42) "Woodwork for Beginners," Griffith, 1916.
†(43) "Advanced Projects in Woodwork," Griffith, 1916.
†(44) "Progressive" System of Industrial Training—series of exercises on blue print paper, sold by Indianapolis house, as late as 1911.
†(45) "National" System for Manual Training—similar to above.
†(46) "Projects for Beginning Woodwork & Mechanical Drawing," Griffith, 1912.
†(47) "Handwork in Wood," Wm. Noyes, 1910.
†(48) "Problems in Woodwork," Edward Worst, 1917.
†(49) "Manual Training Toys," Moore.
†(50) "Manual Training Play Problems," W. S. Marten.

Woodwork as a Part of Industrial Education: By 1910 we may say that woodwork no longer formed the whole or bulk of manual training, but that it was only one part of the system of education through shop work. There was now a big swing toward the vocational or practical values in shop work. The Society for the Promotion of Industrial Education had been formed, and its work finally culminated in the passage of the Smith-Hughes Act in 1917, which provides for governmental aid in the establishment and maintenance of

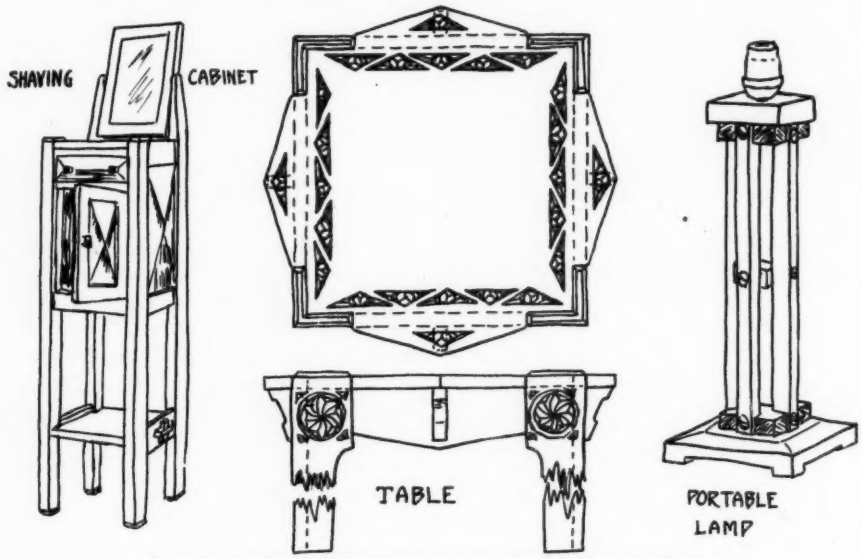


PLATE 8. EARLY PEDAGOGICAL MANUAL TRAINING PROJECTS.
(From drawings in author's collection.)
Note the influence of the arts and crafts movement, through much decoration with "chip carving" in geometrical designs. These pieces are typical of the work around 1905.

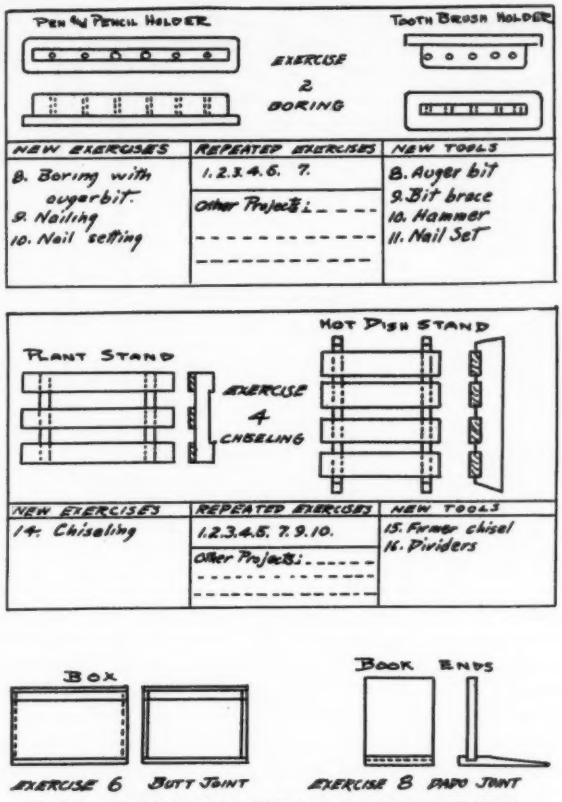


PLATE 9. PEDAGOGICAL MANUAL TRAINING EXERCISES.
(Adapted from lectures and drawings by Prof. Joseph Sandberg.)
These are typical of a "well graded" series of manual training exercises and projects. Note that the projects are useful, and that with modifications they conform to good design.

vocational education. Woodworking is now split up into cabinet-making, pattern-making, wood turning, carpentry, etc. The projects were not only of interest and use to the students, but also of use to the school and the community.

There also are three other changes: a much closer contact with the industries, not only in the visits to the plants as in many cases, some sort of close cooperation was set up. For instance, at Pullman, Illinois, boys in the shops and courses of this nature in the high school, may spend one week in school and alternate weeks getting practical experience in the shops of the Pullman Car Works. A second result was the installation of modern machinery in the shops. Of course, in some cases this may have been carried too far in trying to duplicate actual shop equipment in the schools, but on the whole it meant much more up-to-date facilities. Third, the method of instruction took on a more shop-like form—more attention was paid to shop organization, tool rooms, tool checking, routing of work, and it became quite popular, from time to time, to turn out batches of some useful articles by the factory method—that is organizing the shop into groups with foremen, each boy doing some specialized task, but rotating from group to group from time to time. For example, a school in this locality put out a batch of 24 teachers' desks, similar to the one shown in plate 11, by this factory method.

In teaching methods, principles of psychology and pedagogy were applied in the arrangement and presentation of the projects. Students began to make their own drawings, work up their own designs, and in the drafting room work up their blue prints. Class instruction supplemented by individual help was the usual method of conducting class work.

There had been an increasing dissatisfaction with the ordinary type of manual training. The manufacturers had begun to criticise it on the side of practical results, such factors as expanding commerce, fewer imported workers, and increasing competition began to be felt. The Massachusetts Commission of Industrial and Technical Education made an excellent report in 1906 on this work, and showed many important and urgent facts and needs. The most rabid "vocationalists" could see nothing but practical work throughout the schools—strictly trade training in the shops—but I believe Prof. Crawshaw voices a very sane view of the ideals and purposes of this movement when he wrote in "Manual Arts for Vocational Ends" (1912): "Do all these things which manual training has sought to do in the past, but do one thing more to take it out of what some have called the dilettante stage of development—make it strongly industrial. That is, give every shop process an industrial rating to evaluate in the child's mind the process in the industrial shop. Make the school processes as closely as possible a duplicate of the commercial shop process, and still retain the educational values, mental, moral, and all the rest, which manual training of the past has claimed."

Bibliography pertinent to this type and period:

(51) "Industrial Education," Person, 1907.
(52) "Industrial Education and Universal Education," Eugene Davenport, in "Manual Training" magazine, Dec., 1909.
(53) "The Relation of Manual Training to Industrial Education," C. R. Richards, Manual Training magazine, Oct., 1907.

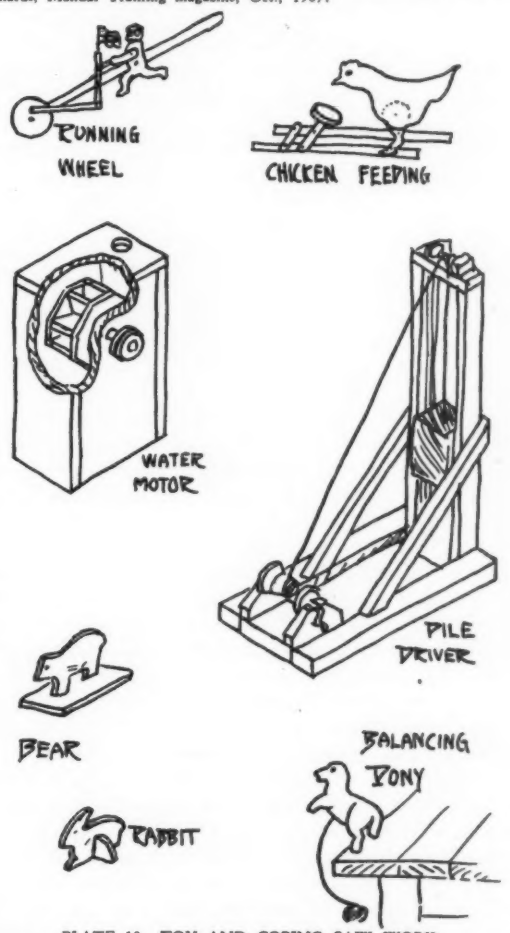


PLATE 10. TOY AND COPING SAW WORK.
That shown is taken from, and is typical of the work of Johnson, Moore, Kuns, and Martin.

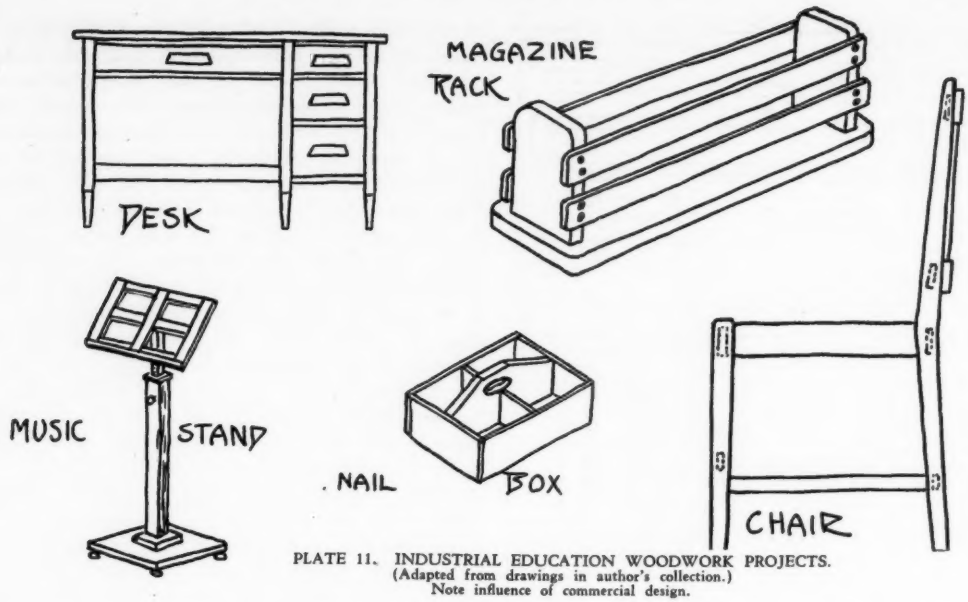


PLATE 11. INDUSTRIAL EDUCATION WOODWORK PROJECTS.
(Adapted from drawings in author's collection.)
Note influence of commercial design.

(54) "Practical and Educational Manual Training in Public Schools," Manual Training magazine, Jan., 1906.
(55) Report of Massachusetts Committee on Industrial and Technical Education in Manual Training magazine, July, 1906.
(56) "Manual Arts for Vocational Ends," F. D. Crawshaw, 1912.
†(57) "Cabinetwork and Joinery," Paul Hasluck, 1908.
(58) Bulletin, 1916, Pullman, Illinois, Free School of Manual Training.
(59) "Beginnings of Industrial Education," Paul Hanus.
(60) "Problem of Vocational Education," David Sneddon.
†(61) "Woodwork and Carpentry," series by King, 1911.
(62) "Courses of Study for High Schools," bulletin, 1912, Pittsburgh Schools.
(63) "Manual Arts in Public Schools of Indiana," bulletin No. 1, part No. 1, 1913.
(64) "Course of Study in Manual Training," Wisconsin State Bulletin, 1914.
†(65) "Manual Training for Rural Schools," by Roehl, 1916.
†(66) "Machine Woodworking," bulletin, Stockton, Calif., Schools, 1917.
†(67) "Carpentry for Beginners," Fairham, 1919.
(68) "Learning to Earn," Lapp & Mote, 1915.
(69) "A Handbook of Vocational Education," Taylor, 1914.
†(70) "Woodwork for Secondary Schools," Griffith, 1916.
(71) "Industrial Education," bulletin, 1920, public schools of Altoona, Penn.

Woodwork at the Present Time as a Part of Industrial Arts: About 1920 we began hearing voices raised in protest against too strong an industrialization of our school shops; and statements that shop work had value in itself as a school subject, as claimed by earlier educators. Woodwork is offered at the present time as:

1. A part of manual training or industrial arts, which is a valuable part of the general culture of all students, or as a general shop foundation, for those who will later take a definitely vocational wood shop course. It is felt that in this industrial world, one is not really educated who has not had contact with the industries. Also that there are many woodwork "jobs" that all adults will come in contact with, and that these courses make those adults better able to judge the product and the workmanship of the craftsmen.

2. Particularly in the junior high schools, as one of a number of "try-outs" or "finding" courses.

3. In the advanced courses, woodwork becomes a specialized and vocational shop, and usually in some form as mill cabinetwork, carpentry, or pattern-making.

Teachers still make use of a combination of materials, relate it to the outside activities and industries, from time to time, try a little factory work, and make some projects for the school, community, and for sale, but usually retained by the boy. Shop teachers make some relationships with other studies when practicable, study the sources of raw materials, go on excursions, bring in outside speakers from the industries, work up a shop library of technical material, designs, and industrial fiction (see bibliography 81, 82, and 83), make use of the shop drafting room for blue prints, and encourage the boys to work up their designs, keeping in mind simplicity, proportion, beauty, and utility. Period furniture modified by commercial design and practices offers a very fine type of project. Stage scenery construction offers a good field for ingenuity and resourcefulness. Two typical projects of today's woodwork are shown by plate 12. Bibliography:

(72) Course of Study, Industrial Arts Department, San Diego, Calif., City Schools, 1925.
†(73) "Pre-Vocational Industrial Arts," Wood & Smith, 1919.
(74) "Education Through Woodworking," $10,000 prize essays, American Woodworking Machinery Co., Dr. Dean, Editor, 1924.
†(75) "Woodworking. A Hand Book for Beginners," C. G. Wheeler, 1924.
†(76) "Wood Turning," Wm. Fairham, 1919.
†(77) "Carpenters & Builders' Guide," Audel, 1923.
†(78) "Course in Wood Turning," Milton & Wohlers, 1919.
†(79) "Furniture Upholstery," E. A. Johnson, 1919.
(60) "Course of Study for Shop Work in the University of Chicago High School," 1920.
†(81) "On the Battle Front of Engineering," A. R. Bond.
†(82) "With Men Who Do Things," A. R. Bond.
(83) "The Story of the 1,000 Year Pine," A. E. Mills.
(84) "Education & Industry," Link, 1923.
(85) "Industrial Arts in Non-Vocational Schools," by Paul E. Klein, in "Industrial Arts" Magazine, Sept., 1920.
†(86) "Industrial Arts for Elementary Schools," Bonser & Mossman, 1923.
†(87) "Lumber and Its Uses," Kellogg.
†(88) "Trade Foundations Based on the Producing Industries," by Rodger, Sowers, Perry, etc.
†(89) "Applied Science for Woodworkers," W. H. Dooley.
†(90) "Wood & Forest," Wm. Noyes.

If one were to hazard a guess as to the future of this subject, certainly we should say that it will always hold a place in the curriculum of the public school, both as general training in the elementary field, and as specific training in the higher schools. There are many problems facing us for future solution. Much more must be done with the course of study—not the old type that lists in detail each individual move and operation, tool, and process, but a progressive one, that keeps an aim before the instructor, that is inspirational as well as steadying. Woodwork instruction must do something about our rapidly diminishing timber supply—forest conservation, re-forestation, wood substitutes, etc. Tree surgery might not be out of place.

Standard tests need to be worked up in this subject—of course there are mechanical tests on the market—but most of these consist of pictures of related mechanical tools and objects which must be combined by the one taking the test. Then there are test boxes containing various mechanical pieces such as clothespin, paper clip, bicycle bell, push button,

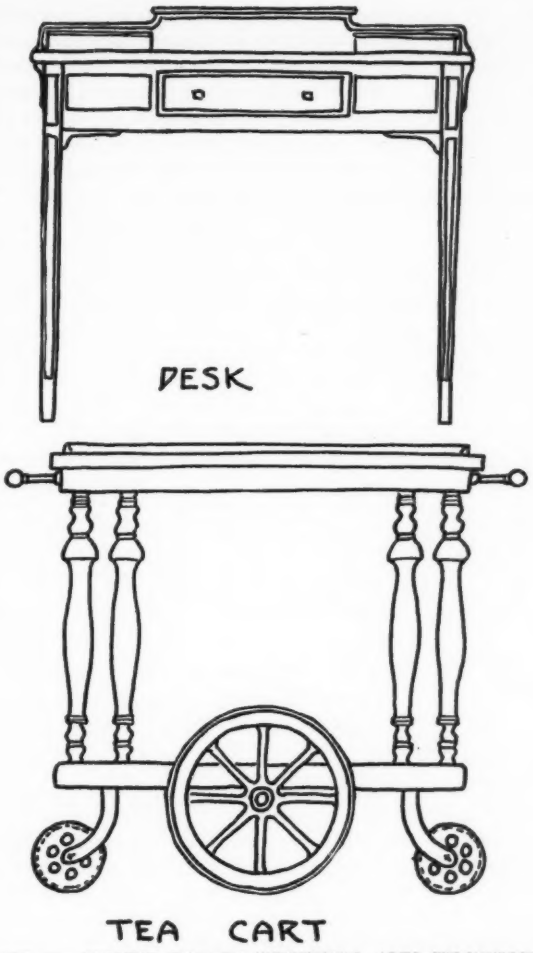


PLATE 12. PRESENT DAY OR INDUSTRIAL ARTS WOODWORK PROJECTS.
(Adapted from drawings in the author's collection.)
Note influence of commercial design, and use of period styles.

mouse trap, etc. All are disassembled, and a certain amount of time is allowed the student in which to put them together. Mr. Bauersfeld, of Chicago, has done considerable with "key word" tests.

In conclusion, I should like to quote from Professor May's writings in the INDUSTRIAL ARTS magazine,[93] for a brief summary of the history of this subject, and the changes through which it has passed during the last fifty years. A glance through the twelve plates accompanying this article may visualize his words. "Starting with exercises which required accuracy of execution, manual training soon borrowed 'interest' as a chief element from the Swedish sloyd. Carrying over accuracy and the interest to the American project, which called for broader industrial knowledge and greater powers of planning and thinking, it accepted the gift of the ideal of beauty, in line, proportion, and finish from the arts and crafts movement. From the 'factory method' idea it got more modern machinery and a better shop organization, as well as a closer contact with the industries of the community. Finally, because of the efforts of the advocates of vocational education to show what industrial arts is *not*, it has been able to show more clearly than ever before what it *is*. It stands today as a vitally important part of American education, appealing to the interest of American boys, challenging their powers, developing their inventive and constructive abilities, and interpreting the industrial life of the nation to those who later are to control that life."

General Bibliography:

(91 Lectures by Prof. Gertrude Laws on History of Education, State Teachers' College, San Diego, Calif., Summer, 1925.
(92) "Public Education in the United States," Dr. Elwood Cubberley.
(93) "The Determining Factors in the Evolution of the Industrial Arts in America," by Prof. Arthur B. Mays in "Industrial Arts" magazine, Feb. and Mar., 1924.
(94) "The Manual Training School," C. M. Woodward, 1887.
(95) "History of the Manual Training School of Washington University," by Coates, in bulletin No. 3, 1923, U. S. Bureau of Education.
(96) "Monroe's Encyclopedia of Education."
(97) "Changes in Manual Arts Instruction in Relation to Changes in the Philosophy of Education," by Chas. A. Bennett in the Industrial Arts magazine for June, 1925.
(98) "The Place of Industries in Elementary Education," Dopp, 1902.
(99) "Industrial Education," Seidel, 1887.
(100) Encyclopedias as: Britannica, Americana, and Nelson's.
(101) "A History of Education," E. L. Kemp.
(102) All available numbers of the Industrial Arts magazine.
(103) All available numbers of the Industrial Education magazine.
(104) Interviews and loan of material from Prof. C. A. Scudder, head of Department Industrial Arts, State Teachers' College, San Diego, Calif.
(105) Interviews and loan of material from P. H. Heron, Supervisor of Industrial Arts, San Diego, Calif., City Schools.
(106) Loan of material from Allen L. Shank, formerly supervisor of Industrial Arts, Mishawaka, Indiana, Public School, present principal Lathrop Trade School, Kansas City.
(107) Loan of material from Prof. Emery T. Filbey, dean of the Downtown College, the University of Chicago.
(108) Lectures of Prof. Joseph Sandberg of Boston Institute at State Teachers' College, Santa Barbara, Calif.
(109) Lectures and loan of tests from Mrs. C. S. Bell, Director of Tests and Measurements, State Teachers' College, San Diego, Calif.
(110) Interviews with Dr. Wm. Proctor, Stanford University.
(111) Interviews with Dr. Edward Cubberley, Stanford University.
(112) Interviews and loan of material from John Beswick, state supervisor of Trade and Industrial Work, California.

THE VALIDITY OF TEACHERS' RATINGS

Max S. Henig, Newark, N. J.

SAUNDERS, principal of the Troy County Vocational School, was in a quandary. He had before him a boy whom he was on the verge of dismissing from school on his shop instructor's emphatic declaration, that the lad was a total failure. According to the instructor, the boy was both mentally and physically incapable of doing the work. In spite of more than a year's school experience, he was still clumsy, inefficient, and apparently incapable of grasping the significance of the instruction and directions given him. He showed neither interest in the trade nor concern over his lack of progress. All this in spite of the fact, that the instructor had carried him along for some time, hoping that the boy would "find himself"; that he would finally grow into his possibilities.

As the lad stood awaiting notice of his dismissal, Saunders reached over and plucked the culprit's record-card from the file, intending thus to gather fresh ammunition for a parting tirade.

Thence arose his perplexity. For the last three months the lad's trade instructor had rated his work at B, B—, B; and a B rating on the monthly report-card sent to each parent is equivalent to "very good"!

The immediate outcome of this particular case need be followed no further; the course of Saunder's subsequent investigation to discover how such an incident could arise will easily bear the telling. This investigation took the form of an inquiry into the validity of the ratings being assigned to the apprentices by the instructors.

Saunders began this study by requesting each instructor to submit a rating on each boy, this to be based on the apprentice's trade ability as indicated by the quality of his work.

The rating was to be expressed in letters in accordance with the system regularly used in the school. The grades with their corresponding equivalents are:

A—Excellent
B—Very Good
C—Good
D—Fair
E—Poor
F—Very poor; Failure

The trade instructor's ratings, when tabulated, showed the following distribution:

Rating	Significance	Frequency
A	Excellent	26
B	Very Good	26
C	Good	44
D	Fair	45
E	Poor	12
F	Failure	3
Total		156

Once he had these figures on paper, Saunders ran his eye over them again and then whistled softly. It was a whistle not only of surprise but also of satisfaction. Now he surmised how the situation was produced that started him on his quest. According to the trade instructor's ratings, 33⅓ per cent of the school's apprentices were doing "excellent" or "very good" work; appreciably more than half, 90 per cent were doing "fair" work or better; less than 10 per cent were guilty of unsatisfactory work; while only 2 per cent were actually failing. Either the school was extremely fortunate in the quality of the boys it enrolled, or—the investigator smiled rather ruefully at the "or"—his trade instructors were alarmingly lenient in their judgment.

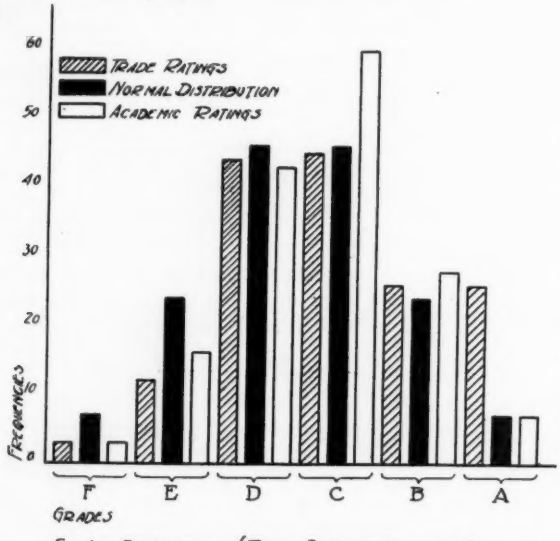


FIG. 1 — COMPARISON OF TRADE INSTRUCTORS AND ACADEMIC INSTRUCTORS' RATINGS WITH NORMAL DISTRIBUTION

The second step in the investigation consisted of comparing the trade-practice teachers' ratings with those assigned the same pupils by their academic instructors. The figures, placed side by side, were as follows:

TABLE I

Comparison of Distribution of Ratings Given by Trade and Academic Instructors

Ratings	Significance	Frequencies	
		Trade	Academic
A	Excellent	26	6
B	Very Good	26	28
C	Good	44	60
D	Fair	45	43
E	Poor	12	16
F	Failure	3	3
Totals		156	156

The most striking divergence was where he had expected to find it, in the number rated as doing "excellent" work. There were 26 such according to the trade instructors; only six according to the academic-subjects instructors. Another significant difference, though not so marked a one, was presented by the "poor" group; only twelve such being present according to the trade instructors, while the academic instructors listed sixteen.

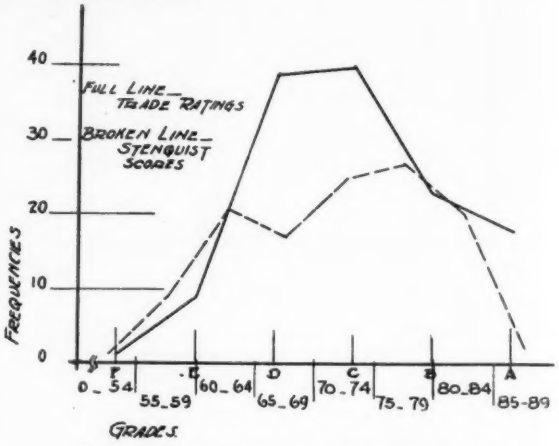


FIG. 2 — TRADE INSTRUCTORS' RATINGS SUPERIMPOSED ON STENQUIST MECHANICAL APTITUDE TEST SCORES.

Which distribution was the more valid? Which approximated the more closely the conditions actually present in the school? Saunders had good reason to believe that the enrollment was of good quality and typical of the school population of the county. The entrance requirements set a minimum age limit of 14 years, and an educational minimum at the completion of the sixth grade. This year 60 per cent of the apprentices completed the eighth grade before applying for enrollment, and of this number, 22 per cent completed one or two years of high school. This school was no dumping ground! Except for the process of selection, that eliminated those below the seventh school year, this was a random group of school boys. Their school ratings should then approximate a normal distribution, with perhaps a slight skew toward the upper limits of the scale. A normal distribution, on a six-step scale such as the school was using would be, for the 156 cases involved:

Normal Distribution on a Six-Step Scale

Ratings	F	E	D	C	B	A
Per cent in each class	4.13	15.58	29.67	29.67	15.58	4.13
Frequency	7	24	46	46	24	7

Assembling the shop instructors' and the academic instructors' ratings on a table, giving also the normal distribution, made comparison and the drawing of inferences easy.

TABLE II

Comparison of Trade Instructors' and Academic Instructors' Ratings with Normal Distribution

Ratings	F	E	D	C	B	A	Totals
Normal Distribution	7	24	46	46	24	7	154
Trade Instructors' ratings	3	12	44	45	26	26	156
Academic Instructors' ratings	3	16	43	60	28	6	156

Doubt as to which set of ratings more truly represented the situation no longer existed. The academic instructors' were actually a beautiful confirmation of the distribution, that the entrance requirements set by the school would have led a trained schoolman to expect. The slight skew to the upper grades, as shown in Figure 1, was undoubtedly due to the fact that the stress of school life had eliminated from entrance those mentally incapable of doing better than sixth

grade work. The shop instructors' ratings just as obviously painted too rosy a picture. They were hugging to their breasts the delusion that they were rearing a set of mechanical prodigies!

That last idea was worth while following up! Were these boys actually above the average in matters mechanical? Was it a peculiar aptitude for mechanical operations that had brought them to the vocational school? The question deserved an answer, and fortunately it was rather easily obtained. About 125 of these boys earlier in the year had taken the Stenquist Mechanical Aptitude Test, and the scores were easily available as was the curve (Figure 2) picturing the distribution. This, again, was a close approximation to the normal frequency curve. According to the Stenquist Test, then, the school's enrollment was merely normal in respect to the distribution of mechanical aptitude. On the obviously sound hypothesis, that mechanical ability was closely related to mechanical aptitude, the trade-ability curve, when superimposed on the mechanical-aptitude curve, should have followed it closely. How widely it diverged, particularly in the higher levels of ability, Figure 2, shows.

Principal Saunders Concludes

Thoughtfully and carefully Saunders assembled the several sheets scattered atop his desk. With equal deliberation, he reached for his memorandum pad and wrote:

Subject for January Faculty Meetings: *Teachers' Ratings*

1. Relation between teachers' ratings and pupil-problem cases.
2. Theory of the normal frequency curve.
3. Trade instructors' ratings compared to normal distribution.
4. Suggestions for improving the ratings' situation.
5. Discussion.

"That will take more than one meeting to get over effectively," he mused, "but the job is worth it."

THE POSSIBILITIES OF A HIGH SCHOOL CARPENTRY PROGRAM

J. Douglas Wilson, Carpentry Instructor, Roosevelt High School, Los Angeles, California

THE STATUS OF industrial vocational education at the present time is such that no one who is intelligently informed on the subject would dream of saying that it is not a proved success. In most States, some form of industrial work, supervised by competent officials, whose offices have been established through the operation of the Smith-Hughes bill, is functioning. Trade classes of many kinds have been formed, making it possible for the average high school student of today to have wide possibilities to select from in the way of trade training.

Concerning the building trades, those employed in some form of building construction constitute a vast body of industrial workers. The average city looks to its building records as the barometer which indicates the growth of the city. Consequently, if a large building program is under way, there is a corresponding large group of workers, of varying abilities and capacities, to carry it out.

Of all the trades that operate in the construction of buildings of all kinds, the carpentry trade, as might be expected, constitutes the largest group. The carpenter is usually the first man on the job, and the last one to leave. A number of other building trades come under his supervision, in a general way, at least, as much of the layout work for many parts of a building, is done by the carpenter. And yet, notwithstanding the large group of workers involved in the carpenters' trade, many schools have not developed a building trade course, emphasizing the carpentry trade.

There are several contributing reasons: One is, that the work is of such nature that if a real carpentry program is going to be developed, real building must be done. This,

ONE-ROOM SCHOOL, MEASURING 28'x40', ERECTED BY THE AUTHOR'S STUDENTS.

TOP: TEN-ROOM COTTAGE—47′x67′.
BOTTOM: FIVE-ROOM BUNGALOW—28′x48′.

naturally, takes the student away from the school grounds and immediately the problem of the organization of a building program must be solved, that will permit the students to attend class sessions in a high school for part of a day and also be able to put in the required three hours on the job without wasting too much time in transportation.

For the small city, however, the transportation problem is reduced to a minimum, as it is usually possible to secure a good building lot in the vicinity of the high school grounds, so that practically no time is wasted in going to and from the job.

For the large city, generally speaking, the transportation problem is one of the reasons why more carpentry is not taught. Here it is virtually impossible to secure a good building lot within walking distance of the high school, particularly if the school is a well established one, as the surrounding territory will be built up solidly. If the school is in a new district or is a new school, then lots can be secured near the school or the carpentry class can assist materially in the building up of the school itself, as there are frequently several out buildings, such as domestic science cottages, propagation houses for the agriculture departments, etc., that are necessary for a well-rounded cosmopolitan high school.

A very feasible possibility, for the large city, would be the establishing of a trade school, which, in itself, would be of such nature that students could be transported to a job for several continuous days, or even to erect a portable classroom on the job, organizing the program so that the classroom work could be dovetailed into the building work with a minimum loss of time.

It has been my good fortune to have been connected with a carpentry program in both types of cities, that is, the small and large city, during the past five years. My carpentry classes, during that time, have been made up of high school students, with one exception, when I had a class at a normal school, at which institution the students in the class were teachers in the woodworking field.

These classes have now completed twelve buildings of varying shapes, shades, and sizes, all the way from a 10′x12′ milk house, to a health cottage 47′x67′. These buildings group themselves into three divisions, one-story bungalows, one-room schoolhouses, and two or three smaller buildings that were erected at a county fair to represent model farm buildings. All the buildings, of whatever character, were put to immediate use, are giving satisfactory service, and will continue to do so for many years to come.

The construction program, in the small city, was house building on lots which were within walking distance of the high school, while in the large city, the work was done on the high school grounds.

From this experience, several things pertaining to the actual teaching of this type of work have become rather fixed in my mind:

First, irrespective of the type of pupil in the class, the work that the boys do will be no better than is demanded by the instructor in charge.

Second, that with proper kind of equipment in the way of tools and working conveniences, such as saw horses and benches, and a well qualified instructor to teach the proper way to do the work, buildings can be constructed that will measure up to the best, and surpass much of the present-day workmanship.

A third conclusion is that it does not pay to "speed up" the boys. While it is, of course, necessary and essential that they be not allowed to loiter or waste time, yet on the other hand, any conscientious boy will always attempt to do as much work as has been outlined for him. Consequently, the result is quantity and not quality.

A fourth result is the unquestioned value of teaching technical knowledge that is related in a very definite way to the trade. Many men in the carpentry trade today have learned their trade by "picking it up," going from job to job. I would like to modify the last statement and say that they

TOP: ONE-ROOM KINDERGARTEN—28′x40′.
BOTTOM: DEMONSTRATION CHICKEN HOUSE—12′x16′.

have learned the tool manipulations necessary and some constructional information. If the technical schools or departments of schools are going to function as they should, opportunity for gaining technical knowledge must also be included in the course. To give the boys a chance to learn tool processes and construction methods is really only teaching them one-half of the trade.

The carpenter mechanic of today has no opportunity on the job to learn to read blue prints, to make shop sketches, to "take off" a bill of materials, to learn the science of roof framing and stair building. Because these facts are true and because this knowledge must be acquired if the graduates are going to measure up to the requirements and possibilities that face them when they enter the trade in a commercial way, the school must teach these things to the students in the building trade classes. These phases of technical knowledge which in school parlance are called related subjects, can be easily taught in the classroom.

A fifth result is that the work is most interesting to the boys who take it, as many express themselves somewhat to the effect that "they do not know where the school year has gone!"—a statement that is at least not common among high school boys. They like the work and are justly proud of their efforts when a building is completed.

From the instructor's viewpoint, a carpentry program is largely a matter of organization. Tools and materials must always be available. Tools must be kept in such a way that a minimum of time is taken in getting started on the job and likewise in cleaning up. The work is fascinating to a high degree, even though the instructor must always be at least "two jumps" ahead of the class and be ready for any emergency, such as rainy weather or lack of materials.

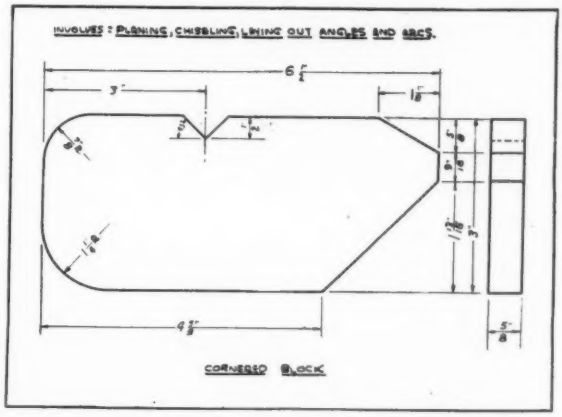
The accompanying illustrations show some of the buildings referred to. While the amount of student labor on the houses varied according to the time available to construct the building, so far as possible, every job that could be done by the boys was done, even though it was not strictly carpentry. Concrete foundations, floors, and steps were put in; foundations were plastered; houses were shingled or roofed with composition roofing; window frames and screens were made; exteriors were painted; interiors were lathed ready for plastering; interior finishing was done; built-in cabinets were constructed on the job. In fact, everything, excepting the plastering, plumbing, interior painting, and masonry work, was done by the boys.

While the work has been "constructional" in nature from the boys' point of view, it has been entirely "instructional" from the instructor's viewpoint and can be made very interesting and educational. Let's have more carpentry classes!

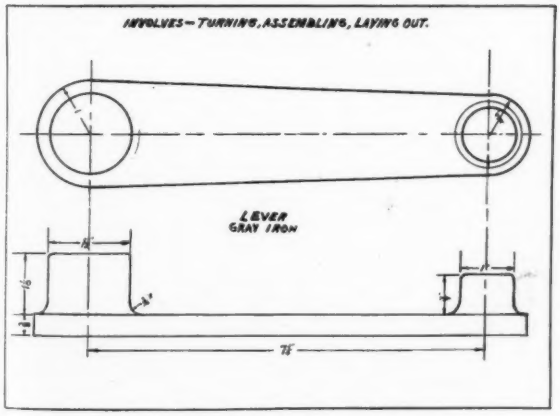
A COURSE IN PATTERN MAKING

C. W. Illingworth, Instructor of Pattern Making, Vocational School, Racine, Wisconsin

AN UNDERSTANDING of patternmaking is today an important step in training for industry. Patternmaking is vitally linked up with the metal industries and anyone entering them should have some knowledge of this art. The draftsman will more fully understand his work and the use of his drawing when it goes to the shop; the molder, for whose use the pattern is made, will be able to make suggestions as to the construction and method of molding of the pattern. This is true also of the core-maker. The machinist and the tool designer will be better able to make their wants known. A knowledge of patternmaking is essential for young men preparing to enter the engineering field or for boys going no further than through the high school or vocational school who will find their places in industry. As a life work it will be found most interesting. There is very little of repetition; practically every job being different.



TYPICAL IN UNIT ONE OF THE AUTHOR'S COURSE.



TYPICAL PROBLEM USED BY THE AUTHOR.

In developing a course in patternmaking for vocational and high school students, such elements as length of time spent in the shop, ability to grasp the subject matter, future use of the knowledge gained, the number and types of jobs the student should cover in a given time, and the arrangement so that interest will not lag, should be carefully considered.

Vocational students over 16 years of age usually spend four hours a day in the shop; high school students five hours a week. Some of these boys have had previous training in the manipulation of woodworking tools and the reading of drawings. However, there are many who have had practically no previous training. Since each project in the course should bring out a definite point in patternmaking, I believe it is well to start each boy at the beginning; those who have some knowledge of woodworking tools and the reading of drawings, will soon forge ahead, as the work is entirely individual.

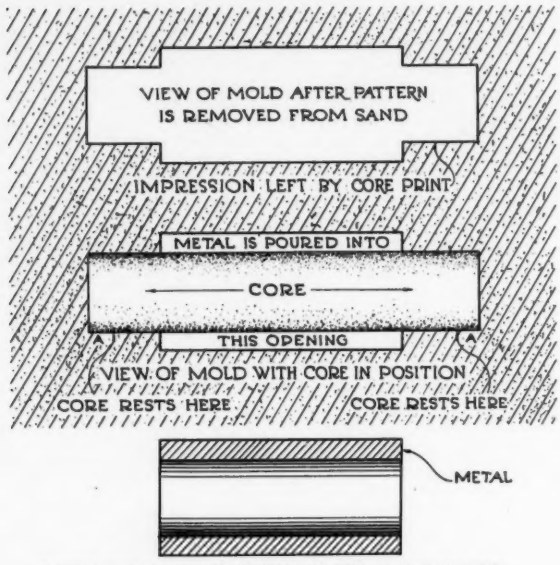
RACINE CONTINUATION SCHOOL
Patternmaking

THE HORIZONTAL CORE

Charactistics

The horizontal core—

1. Lies in the mold in a horizontal position.
2. The core prints for this core are straight. They do not need extra taper for the cope as in the case of the vertical core.



3. The core box is usually only a half core box.
4. The weight of the core is carried in places made by both core prints, as at points A.

RACINE CONTINUATION SCHOOL
Patternmaking

FINISH ALLOWANCES

Kinds and Use

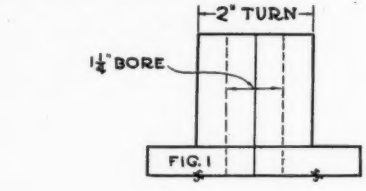
Finish allowances are necessary for the machinist's use in smoothing and cutting a casting to a certain size.

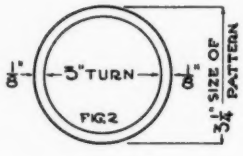
Where a finish mark (f) is shown on a drawing, or such words as drill, ream, bore, turn, and spot face are printed after a dimension, it means that the machinist is to do some work at that place, Fig. 1.

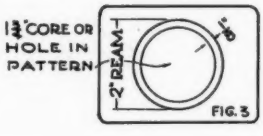
Now, in order that there may be some extra stock on that place for the machinist to cut away to get it smooth and accurate, it is necessary to add to the pattern or in other words, make the dimension a certain amount larger.

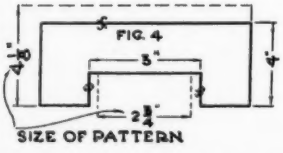
Application

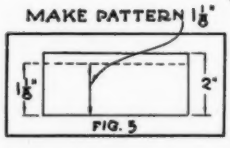
1. The extra amount to allow for grey iron, malleable iron, and in some cases, steel castings, is $\frac{1}{8}$".











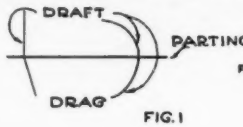
2. An allowance of $\frac{1}{32}$" on brass and aluminum castings is usually enough. If these castings are quite large it is necessary to add $\frac{1}{16}$".
3. In the case of round pieces the finish would be round the complete circle and so it would be necessary to add double the amount of finish to the dimension. (Example, 3" turn would be 3¼" for the pattern.) See Fig. 2.
4. Holes and other inside dimensions calling for finish, bore, drill, etc., *should be made smaller*. That is, if a hole is to be cut to a certain dimension, we must make that hole smaller so that there will be extra metal in the casting to be cut away until the required dimension is reached, Fig. 3. The machinist can make holes larger but he cannot make them smaller.
5. Twice the amount of finish ($2 \times \frac{1}{8}" = \frac{1}{4}"$), must be *subtracted* from dimensions given for round holes. Fig. 3.
6. Twice the amount is *added* to dimensions given for outside dimensions of round pieces. Fig. 2.
7. Where the outside surface to be finished is flat, *add* finish only on the place it is called for, Fig. 4.
8. Where a flat surface is to be finished or machined in a hole, subtract from the given dimension. only for that place, Fig. 5.

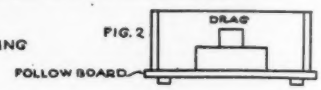
RACINE CONTINUATION SCHOOL
Patternmaking

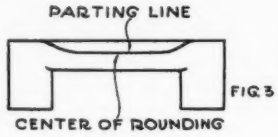
THE IRREGULAR PARTING

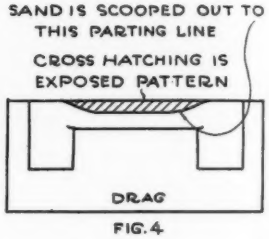
Many patterns have a straight parting, that is, the line or imaginary line which denotes where the cope and drag meet. The draft is worked off in opposite directions from this point, Fig. 1.

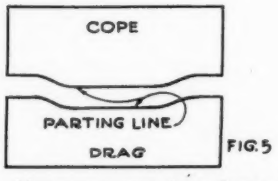
When the pattern is put in the sand a parting must be struck off in the drag sand, and parting sand, a fine white sand, is put on this surface to prevent the drag sand from sticking to the cope sand. These straight partings are formed by the follow board when the pattern is first rammed up, Fig. 2.











Now many patterns do not have a straight parting. In other words, the line where the cope and drag meets is not straight. This is caused by some rounding or slant or projecting piece which we say must be "coped down to." The draft at this particular point is started on a different line than other parts of the pattern. See Fig. 3.

The shape of each irregular parting varies according to each job. The parting line is determined solely by the way the pattern is drafted. The sand in the flask is then formed to meet this parting line on the pattern.

A slicking tool, a flat or spoon shaped tool, is used to cut and smooth the sand. When the sand has been so formed and slicked or smoothed off, parting sand is sprinkled on. In this position that part of the pattern which is to be in the cope, is left exposed, Fig. 4.

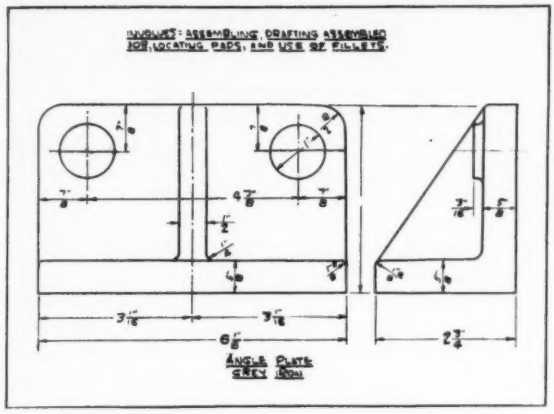
The cope flask is then put on, sprue pin located, and rammed up. When the cope half is drawn off it will have an irregular shape, Fig. 5.

The pattern is drawn out, a gate cut, and the cope put back in place. Naturally, the two irregular shaped boxes of sand will just fit together.

I believe a great variety of short time jobs, each bringing out a different point, especially at the beginning, will more nearly serve the student's needs and with this arrangement will come added interest in finishing a job in a short period of time. Pride of accomplishment in a finished piece of work is thus more often stimulated. Jobs which take a number of weeks or months to complete, although they may cover the same principles as a number of smaller jobs, are certain to tire the young boy. Then, too, it is extremely difficult to find lengthy jobs covering the same principles as a half dozen smaller jobs, without too much extra repetition in construction. It would not be practicable to teach pattern-making according to types, that is, all of one type first, then all of the next type, and so on.

Patterns consist of solid, split, segmental, sweep, shell, built-up, staved, and loam work. They may be solid segmental or split segmental; staved solid or split staved. Some solid patterns are simple; so too, are some split patterns. Solid patterns are often complex and difficult; so too, are split patterns.

In the course I have developed there are eight units covering a period of two to three years, depending on the



TYPICAL PROBLEM OF UNIT 1.

speed of the boy. When the eight units are completed, there are a number of major problems, consisting of a complete set of drawings for a gasoline engine, an air compressor, vises, grinders drill presses, and lathes. The student is permitted to make a complete set of patterns of the object selected in the major problems. Very often there are patterns to be made for the other school shops, machine shops, garage, etc. When patterns of this sort are made, they take the place of similar jobs in the regular course. The division of units is made not as to types, but rather as to time and to serve as a check-up at the end of the unit on the subject matter covered. Students in the vocational school are permitted to make a change of classes at the end of a ten weeks' period, and as the ten weeks comprise the quarter of the school year, a division of units of ten weeks each is desirable.

The first unit consists entirely of solid patterns bringing out those elements of patternmaking which the boy is able to grasp and accomplish. He gets the fundamentals of lathe work, bench work, molding, fitting, and finishing. The second unit brings out new points, face-plate turning, split patterns, cores, etc. Here there are solid patterns as in all of the units, but of varying degrees of complexity. Each job has been carefully selected and serves a new and definite purpose.

(To be Concluded)

LITTLE ARGUMENTS ON GREAT PRINCIPLES

A Practical Gift for a Practical Man

"I see you have a cartoon over your desk, Mr. Try Square; what is it this time?"

"That cartoon, Mr. Frills, is the keenest bit of sentiment concerning the Christmas spirit that I saw or heard during the holidays; it represents Business excluded from the Christmas party and hanging over the gate protesting that there could not and would not be a Christmas without his help."

"I saw that cartoon in the paper," sighed Frills, "and I was reminded of it when our family got together on Christmas night. I got six neckties and traded the whole six with my brother for one that suited me. I always was rather particular about my ties."

"That's it! That's it!" exclaimed Try Square; "this Christmas business can't be done nowadays without business methods. Of course, it works both ways; Christmas promotes business and business makes Christmas possible!"

"And what did you get for Christmas, Mr. Try Square?" drawled Frills.

"Me? Oh! I got the finest Christmas gift that a teacher ever got, Mr. Frills; a beautiful shaving cabinet from my class in manual training; I knew there was some mischief going on in the shop for the past month but the boys took my breath when they presented that cabinet on which every one had worked while I was away."

"But, you do not shave yourself, Mr. Try Square, and I do; what will you take for that cabinet?" asked Frills with a twinkle in his eye.

"Say, Frills, if you work as long as Methuselah and become as rich as Croesus, you will never be able to get that cabinet," said Try Square, as he put the cartoon in the waste basket.

SCRAPS OF CONVERSATION

Laurence Parker, Pittsburg, Kansas

"Some boys are just impossible to get along with. We should have an opportunity school," said the principal of the high school. "Now, I had a case this morning—just had to fire him from school. I had fooled along with him all that I could and this morning I sent him home.

"You see, he wouldn't do anything except manual training work. His English was a failure; he wouldn't study history; and he was slower than cold molasses in mathematics.

"Oh, I suppose he is down town in some pool hall. That's the place such boys drift to when we turn them loose.

"Yes, our manual training department runs all day but under *our system* we cannot keep a boy in school who doesn't take the required subjects."

"You ask if it would not be better for us to keep him in our shops all day than to let him drift to the pool hall? I'd like to talk that over with you but I'm overdue at a principal's meeting. Good-bye. Come in again."

"You might be interested in a boy we used to have in our high school," said the teacher. "Tom had the most vivid imagination you ever saw. He actually thought he saw his own thoughts. Perhaps he believed he had studied his lessons because he thought he should do so."

"Couldn't get Tom to spell correctly, or use good English. How he did like to putter around our shops, though."

"He managed to graduate from high school, and to our surprise, his mother talked him into going to engineering school. They say he headed straight for the engineering shops and passed in no other subjects. Of course they sent him home, but he brought with him the model of a pump he had worked out while there. No other pumps just like it, so they say. Anyway, he sold it on royalty to a big company in the east."

"His education had been a failure for it hadn't fitted him for anything in life. All he cares for is to try to improve that pump of his so it will pump all liquids. Too bad about Tom!"

"It's a strange thing," said the master mechanic of the division shops of a big railway system, "that the high school boys in our town cannot pass the entrance examination in arithmetic which apprentices must take."

"No, I've never taken it up with the school authorities, but they must realize we are the only industry in the town, and if their graduates are mechanically inclined and want to remain here, their best chance is as an apprentice with us."

INDUSTRIAL-ARTS MAGAZINE

E. J. Lake S. J. Vaughn
Editors

FOLLOW-UP AND PUT OVER

Business has adopted the "Follow-up" as a necessity to "putting over" their propositions.

The individual is so crowded with impressions that many of them are discarded on sight; then comes the follow-up reminding him of a passing opportunity; he nibbles; a second follow-up; he bites. Then comes the "put over." If bitten, the biter will not bite again except in revenge.

The school is a great, thriving, and beneficial business which is slowly adopting the follow-up plan. The graduates of our schools have been considered as a finished product which passes out and on without further obligation or concern on the part of the school organization. It is rare, indeed, to find a roster of graduates kept up-to-date in schools other than a few institutions which have established bureaus for this purpose. The results have invariably been of great advantage to the graduate as well as to the school.

Next to the home, the school is the institution of greatest opportunity for affiliation with the greatest number of individuals.

There is indication that vocational education will of necessity establish the follow-up plan where general education has neglected to do so. It is a fair prophecy that if vocational education does not establish helpful interest and concern toward the graduate it will fail of its purpose.

Vocational education must "follow-up" and "put over."

THE GREAT INCENTIVE

It is significant when Leander S. Harding, Industrial Education Adviser of the Associated Industries of Massachusetts, decries the tendency of encouraging boys and girls to defer their vocational choice.

Mr. Harding says "We should encourage the choice of a vocation at the earliest possible opportunity; any other course will only widen the gap between school life and real life."

We surmise from this statement made before the Vocational Education Society of Boston, that Mr. Harding's greatest difficulty in advisement has been that of advising boys and girls who have the least definite interest and purpose in their school work.

The schools are rapidly becoming a part of real life by reflecting the interests of the community. This is giving the boys and girls opportunity to find themselves in self-expressive occupation and study.

The right and normal ambition of youth is to find his place in the competitions of life and to become independent of favor.

Children, no less than adults, have their secret ambitions with the great difference that, given encouragement and advice, they can often attain their ambitions.

The ideal school is a part of life in which the youth is developed for the obligations of adult life, and the sooner this great incentive of vocational independence can be secured in the mind of a child, the more purposeful and effective will the school experience become.

Certainly, the problem of adapting citizens developed for service that functions with the social order in which they must live is preferable to the adaptation of citizens who are jacks of all interests but serviceable in none.

The great incentive of each life is some definite service, and the sooner it can be acquired, the better.

ART TEACHERS ARE INVITED

Art teachers have been known to deplore a lack of interest and understanding on the part of school officials with regard to art as a school subject. Art has been generally considered by school officials as a frill or flounce on the educational equipment, and in times of dire need the frills and flounces have been temporarily trimmed.

Now comes to teachers of art the invitation to cooperate with no less distinctive official body than The National Committee of School Superintendents, who are engaged upon a general scheme for a complete American public school curriculum, including art. We have thought that more attention and respect would have been given art instruction if teachers of art had been more capable and insistent. Art instruction is probably most difficult to formulate.

The invitation extended by the superintendents to teachers of art is supplemented by suggestions to those who are revising their courses and who will cooperate with the committee.

These suggestions are recommended as taking the form of "Specific principles for a public school curriculum."

One of these principles is that a school course of study must deal with a selected list of activities and subjects. This may well be taken by the teacher as implying that teachers of art have attempted such a variety of work that it is advisable for them to do fewer kinds of work, and to do them better.

The adaptation of art study to the locality is also suggested.

Here again the committee has hit upon the idea that no course in art can be adapted to all communities and so emphasize the contention of many thoughtful and capable teachers of art.

This impression does not deny the possibility of formulating objectives common to art and not in common with other school subjects.

Under the topic, "Research," the suggestion is made that advances made by scientific research may be interpreted in various ways.

We hardly know whether "Scientific Research" referred to is social or psychological or mechanical or physical or all of these.

Perhaps the committee had in mind the general change in social conditions to which the schools are adapting their work. It is evident in this regard that applied art makes the stronger appeal and provides the better pedagogical approach to the greater number and should, therefore, be employed whenever possible. Formulated pattern without application to definite projects may have no better or lasting results than formulated instruction in other subjects.

It is gratifying to the enthusiast that the committee insists on the application of art to a comprehensive list of human interests.

Life, Liberty, Happiness, Common Defense, and General Welfare reads like a list of the objectives of education in general, yet the committee cites this comprehensive list as the particular objectives of art education. We surmise that such a general demand is made upon art for want of agreement upon more specific demands which can only be made by the specialist in cooperation with the educator of broad vision.

We hope that such cooperation may be secured.

AMERICAN VOCATIONAL ASSOCIATION CONVENTION SIDELIGHTS

The value of the Louisville convention of the American Vocational Association seems to grow, with the passing of a month which has given an opportunity for reflection and evaluation of some sidelights of the meeting. The convention made a beginning of united effort for vocational education, an effort in which educators, as well as industrial leaders, took part. It may be worth while to discuss some of the pertinent sidelights of that beginning.

The responsibility for spreading the enthusiasm of eminent speakers at the convention, and of spreading the inspiration gained through personal contact with leaders in the field of vocational education, rests upon the shoulders of every person who attended the convention. It is to be hoped that the messages of leaders in their respective fields of endeavor had more than a momentary effect and that all communities have begun to feel the effects of the A. V. A. Some will start immediately to put into operation a new thought or idea gained through contact at the meeting, while others will plan ahead for a reorganization or improvement in their work at a future time. These people have something definite. However, we still have the few who will make a hurried report to those interested, assure them of advancement in the cause, etc., etc., and then settle down in the old rut until another convention hies them on to the annual lobbying excursion. The results of the convention must be measured by the progress in educational thought and achievement after the return of those in attendance to their particular homes and work. The eloquent addresses and exchange of greetings play their part, but the final judgment must rest upon the results of our work with students.

An outstanding feature of the convention was its close connection with industrial problems. It seems that now, more than ever before, the necessity for closer cooperation between school and industry is evident and appreciated. The increasing stress placed upon industrial representatives on the programs and the movement to stress "adult education" are indications of the importance placed on industrial thought by school authorities. The cooperation between schools and industry is not yet what it should be to give the best results, but both sides are aware of its benefits. It is gratifying to note that there has been some progress.

The delegate plan of conducting the business session of the meeting was a new venture and offers new problems. A delegate should carry with him the wishes of those whom he represents and should be so instructed by such A. V. A. members. If the policy of democracy is to prevail, it would seem that the important questions to be voted upon by the House of Delegates should be submitted first to the vast number of teachers who make up the great body of the association. The opportunity was given to those present for expression, but the rank and file of members were not given the consideration they should have had. Again, the great mass of industrial workers, and employers might well be represented in the House of Delegates for the best possible future program of vocational education. The combined forces of all agencies are necessary for a logical program to meet the needs of all concerned. In this way only, will the best expression from industry be obtained, and that cooperation, so much sought, will be nearer a reality than an ideal.

The campaign for affiliated state membership is functioning for the good of the association, if increased membership can be taken as a criterion. The number of states affiliating is growing and the enthusiasm of the officers is great. An advantage of state affiliation which no doubt will be kept in mind, is the opportunity to submit propositions of national importance to the state Associations to be relayed to the members for thought and action prior to the annual convention of the A. V. A. Thus contact with members may be more effective and successful.

As has been true of most of the past meetings, the programs and attendance were dominated by executives, college and university men. The great rank and file of the members (*the teachers*) were conspicuous by their absence and the industrial leaders were not any too prominent. When our school administrators have convinced themselves that the teacher is the real source of student inspiration and instruction and that first hand information and inspiration are obtainable only through personal contact at the convention, we may look for school boards to defray part or all of a teacher's expenses to the annual meeting along with the expenses of the director or superintendent. It cannot be said that all superintendents and directors are good teachers, or that the inspiration they receive always reaches the teacher, to whom we must look for results. From the standpoint of industry it would be advantageous to the cause of vocational education if the attendance at the convention of the association was half industrial representatives and half educators. This would tend to take away the excess professional atmosphere which, if done, surely would do no harm.

The convention was a decided success if those in attendance have returned "on the job" and strengthened or improved their courses; if industry was impressed enough to turn out in larger numbers another year; if the officers and executive committee see clearly the responsibilities and opportunities for the combined organization with its state affiliations; and if every member believes in the cause of vocational education and responds to intelligent leadership. A bright future looms and we may expect big things, for with the changing emphasis and continual improvement in method of approach, the A. V. A. is in a better position to cope with these problems than our national societies of the past.

VOCATIONAL GUIDANCE

Vocational and educational guidance is to education what efficiency engineering is to industry—a definite and more or less formal attempt to insure that every pupil will be provided with facilities and incentives to develop all his capacities—the grease of the industry.

It should therefore be apparent that one of our first attacks in solving the problems of vocational guidance is to solve some of the problems which come under the head of *limitations of training*. How can we predict success or failure unless we really *know* who will succeed and who will fail? What percentage of colored children, if given a truly equal opportunity with whites, will surpass the average white in the specific abilities such as ability as house carpenter, as dentist, as physician?—*Herbert A. Toops, Ohio State University.*

A speaker at the recent meeting of the American Society of Mechanical Engineers said that too many boys seek white collar jobs. Thereupon, the Camden, N. J., *Courier* remarks: "It is up to the manufacturer to tell the youngsters good reasons for going into overalls. Camden wants a vocational school. As long as the committee in charge of plans is asleep, the Camden County boys are being deprived of their rights."

Flash powder makes a more brilliant light than the arc lamps, but you can't use it to light your street corner because it doesn't last long enough. Stability is more essential to success than brilliancy.—*Richard Lloyd Jones.*

What do we live for, if it is not to make life less difficult to each other?—*Goethe.*

Blind alley and dead end jobs are things that must be done. It is futile to declaim against such work. Some children must start there. But we must not leave them there. We must let them go to work and come back for the education they need.—*Robert O. Small.*

A METHOD OF TEACHING VALVE GRINDING

Leonard Tordoff, Teacher of Auto Mechanics, Boys' Continuation School, Fall River, Mass.

THE INSTRUCTOR OF AUTO MECHANICS in a boy's continuation school may be considered very fortunate, for here is a subject in which almost every boy is interested. If you are inclined to doubt this statement, try the following: The next time your spark plugs need cleaning, draw your car up to the curb of any street on which there are a number of boys playing; then go about the job of cleaning the plugs as though you were in your own garage and, if within a short time you are lacking an audience of juveniles, then you are not living in a representative American community.

To the average person the automobile is a wonderful machine, but to the boy it is all of that to the "nth degree." He dreams of the day when he will own one, and with that idea in mind he wants to know all about it, how to drive it, how to make it run, how to repair it and so keep it running. It furnishes him with "material" for the many questions that only an interested boy can ask. Here is a study which he likes and because of that fact he enters into it with zest. He comes to school with questions which he wants answered and ideas which he wants tried out and when he starts on the job assigned to him, he does so with the idea of "finding out" for himself. He is accumulating knowledge of practical value, some of it by observation and experience outside the school, some by experience and studying within the school, but the fact that the knowledge gained is of practical value and used to good advantage, whenever it can be applied, can be proven by a visit to the boy's home or to his place of employment.

There is no doubt about the boy's interest when he first enters school; the question of keeping him interested is one of shop equipment plus the personality and methods of the instructor.

As a result of a questionnaire, as to three reasons for their choice of the study of the automobile, it was found that a majority of the boys wanted to become mechanics. Another reason for their selection of the course was that they might be able to keep the family car in good running order. A great many boys were desirous of becoming chauffeurs, while by far the greatest number wanted to know all about an automobile so that when they bought one they could take care of it.

It is not to be expected that every boy who is enrolled in the auto mechanics course of a continuation school will find work in the automobile business, but there is no question of the boy's determination to own a car as soon as possible.

In taking care of an automobile there are a number of jobs, which, with a little practice, the average boy can master. One of these is valve grinding. How to teach the operation of valve grinding in a part-time continuation school presents its difficulties. First, there is the large number of boys taking the course, the number running from 125 to 155, which is much larger than the number in most full-time trade schools. Then there is the constant change of boys; some are leaving on reaching a certain age, while new ones come in from time to time. The new boys are started on jobs in groups of two or three—friends whenever possible—and in the course of time arrive at the job of valve grinding. The problem is to provide an opportunity to practice valve grinding for every one of a large number of boys in groups of two or three at a time.

It is obvious that, if a cylinder block were used for this purpose it would be but a short time before the valve seats would become so large and deep from continued grinding as to necessitate the block's refacing and eventual replacing.

Refacing a cylinder block is an impossibility in most school shops, while replacing quite frequently means finding a discarded block. In order to overcome these difficulties, the writer designed the practice-valve grinding block described and shown in the accompanying sketches.

The blocks weigh approximately 16 pounds and are made of cast iron, which at ten cents per pound, brings the cost of the block to $1.60. The valve, valve stem guide, valve spring, and spring seat are Ford parts and cost all together, fifty cents, bringing the cost of the valve grinding block when assembled to $2.10. Six blocks were finished. The machine work was done by the boys, which made a good project. In order to show the valve operation, one block was finished like sketch No. 1—this block is not used for practice valve grinding. The remaining five blocks were finished like sketch No. 2, that is, without valve tappet or cam shaft. The six blocks were bolted to the bench at a distance of about three feet apart, and were found to be at a suitable height for a majority of the boys, while for the shorter ones, small movable platforms about six inches high were made.

The method of teaching valve grinding which has been used for the past three years in the Fall River Boys' Continuation School with splendid results is outlined below: The boy is first given a blue print similar to No. 1 and a job sheet, and is told which block he is to use. Incidentally, this job sheet is kept for protection in a leatherette case having a celluloid front, and an opening in one side through which the job sheet may be inserted. This case he may hang up, or place on the bench in front of him wherever he can best see to read it. The boy then goes to the toolroom for the necessary tools listed on the job sheet after which he proceeds, with the aid of the blue print, to follow the job sheet instructions. If any difficulty is experienced an older student is designated to assist him, but only to the point where he is ready to start grinding.

As soon as the boy starts operating the valve grinder, careful watch is kept by the instructor, in order to make sure that he operates it correctly, and while there are some who grasp the idea more quickly than others, it takes the average boy at least one and one-half hours of one of the two-hour shop periods to learn to operate the different kinds of valve grinders satisfactorily.

Because it is the one most commonly used, particularly by car owners, the boy is first taught to use the valve grinder which resembles a brace, and this is the one for which the job instruction sheet has been made out. He is next shown how to use the kinds of valve grinders used by mechanics, so that should he procure a position as an apprentice mechanic, he will be able to go about the job of valve grinding in an approved manner using approved tools.

After the boy has mastered the operation of the different valve grinders, he is sent to a practice valve grinding block, in which the valve and valve seat have been refaced—this is considered important as it gives him more nearly actual repair

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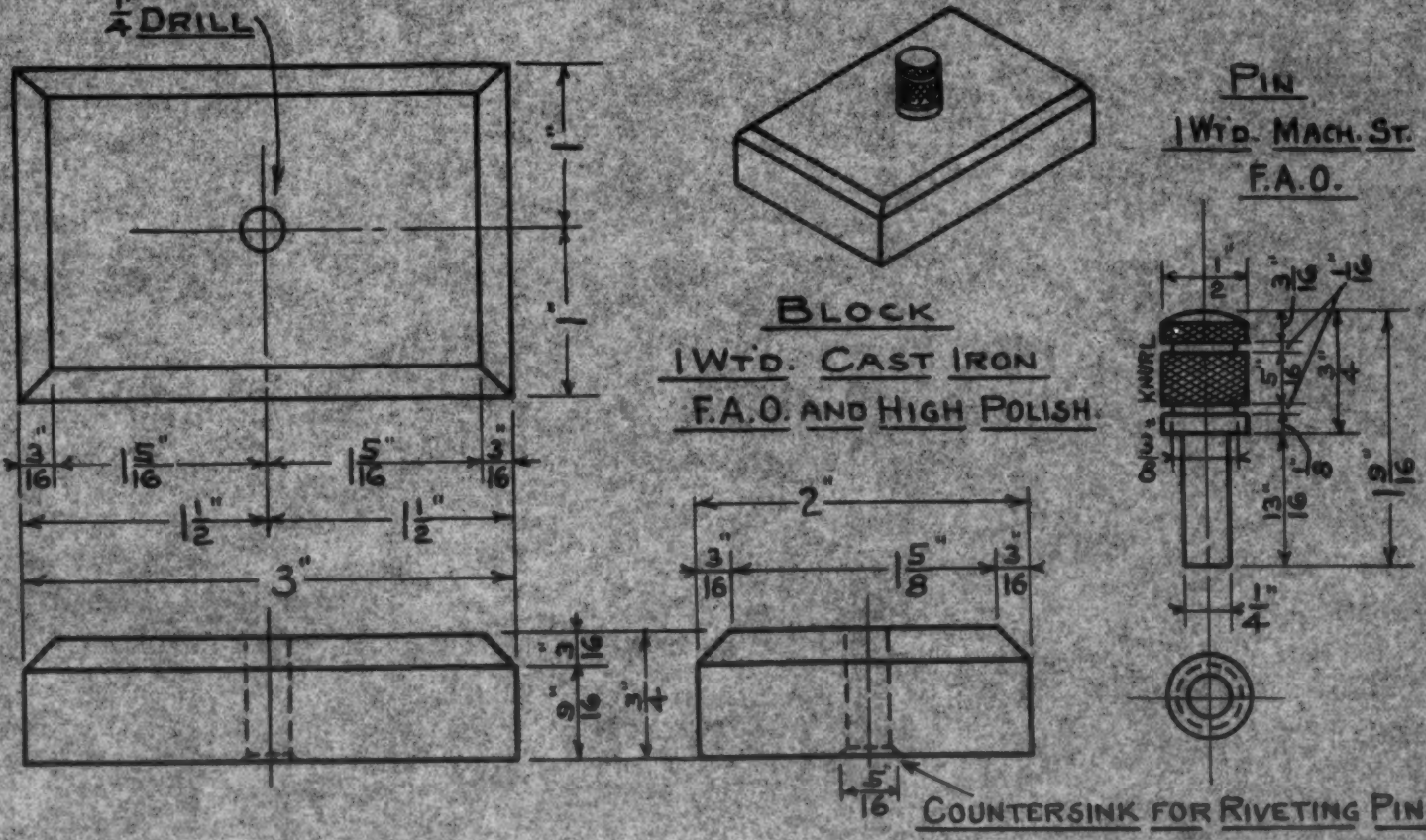
PAPER WEIGHT



Designed by Joseph T. Cusack, Baltimore, Md.

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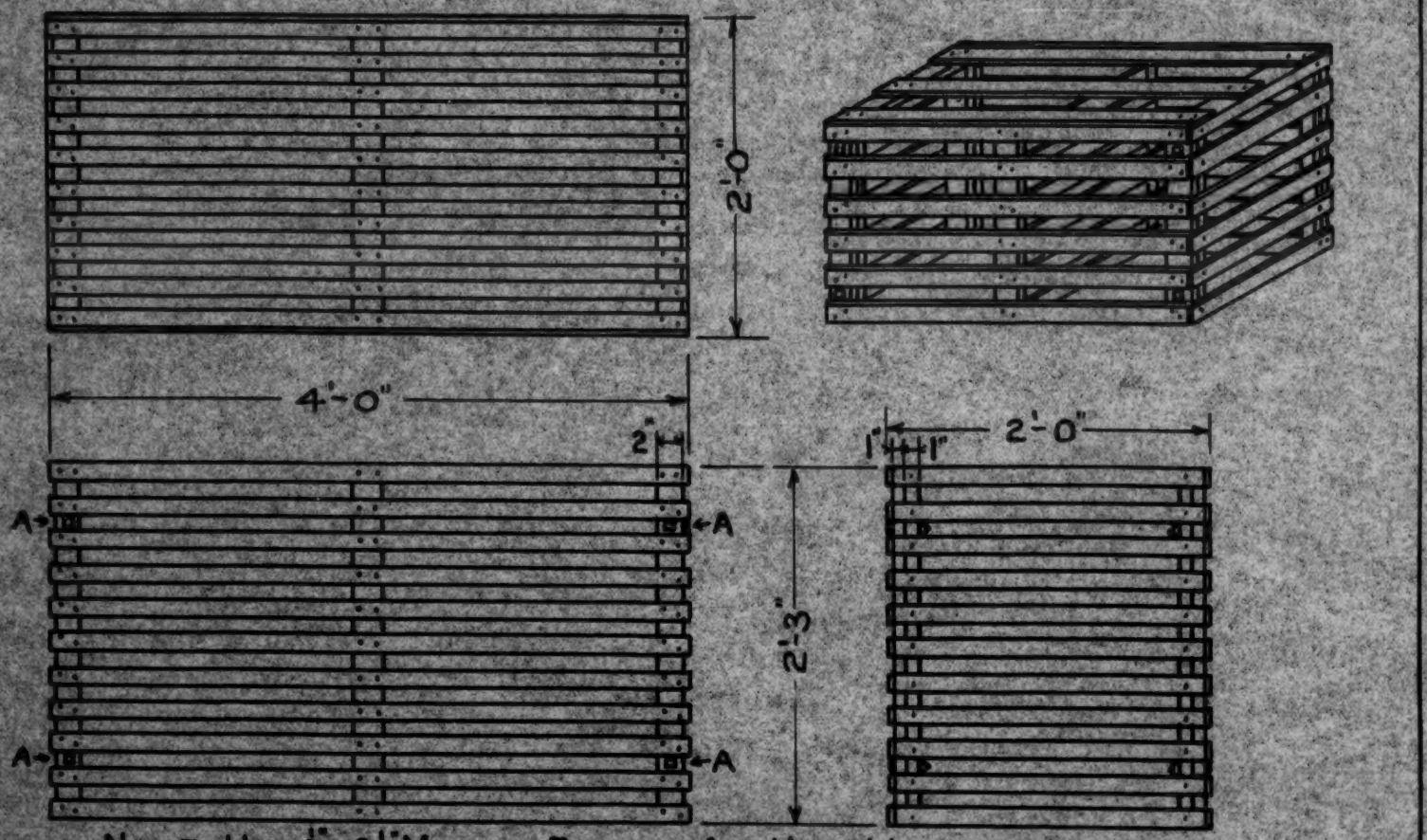

NOTE - USE $\frac{1}{4}$" x 2$\frac{1}{2}$" MACHINE BOLTS AT A. USE #1 LATH ON ALL SIDES.

POULTRY CRATE-PEN

Drawing by Fred Short, Bruce, Wis.

For Details see Page 85, Industrial-Arts Magazine, February, 1927.

Detail of joints
Scale 3"-1'-0
¾" chamfer
or ¼ round
Adjustable self supporting curtain rods
Double acting hinge
The adjustable self supporting curtain rods used in this screen may be cut down at points A if exact lengths are not at hand
A
B
20"
5'-9"

Drawing of Folding Screen by Dean Johnson, Gardner, Mass.

For Details see Page 63, Industrial Arts Magazine, February, 1927.

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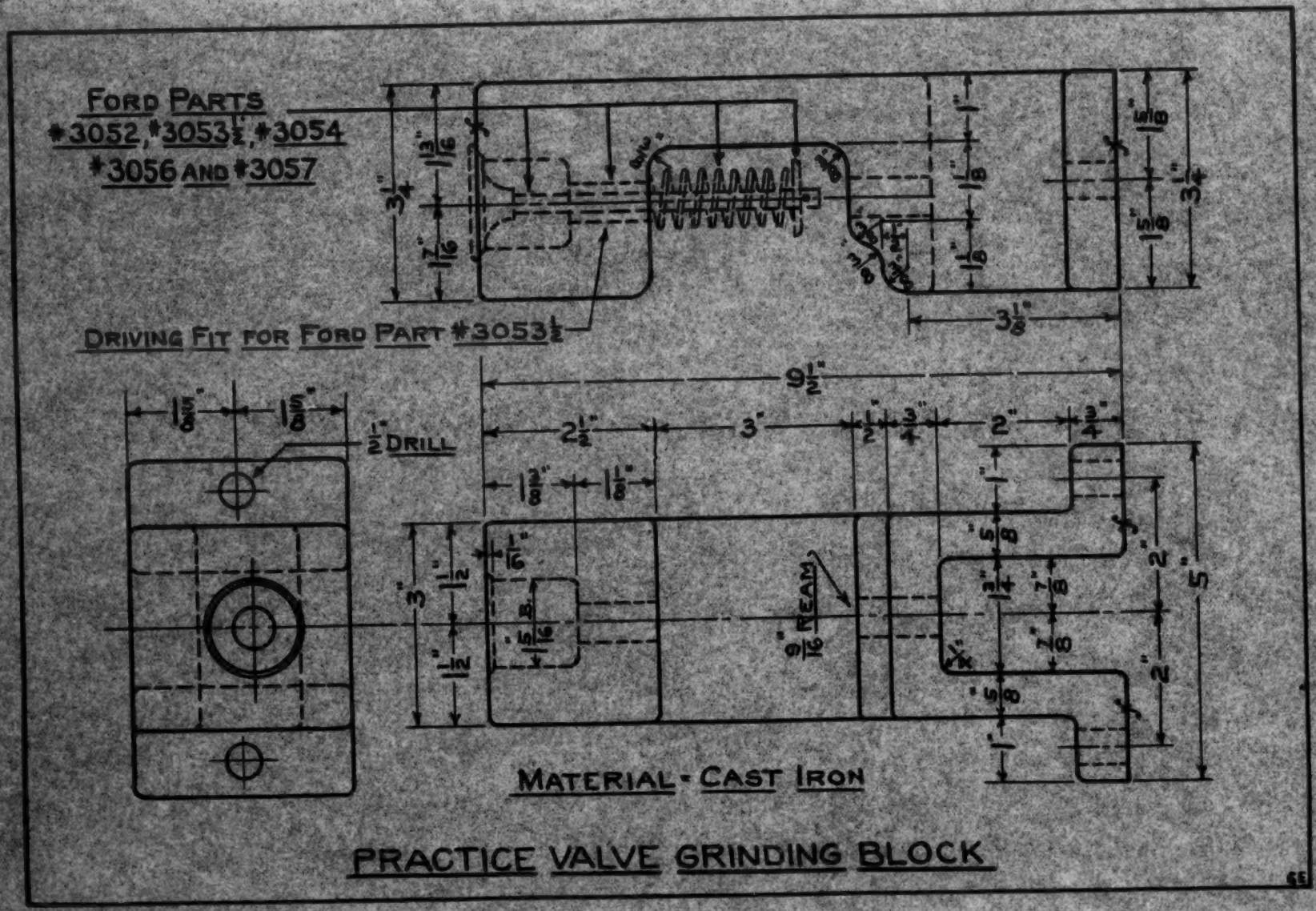


Drawing by Leonard Tordoff, Fall River, Mass.

FIGURE 1.

For Details see Page 60, Industrial-Arts Magazine, February, 1927.

shop conditions. Here he is told to grind the valve according to the instruction sheet following instruction No. 7 very carefully, and when he thinks the valve and valve seats are properly ground to notify the instructor who will examine the job. If his work is approved the boy is then told to assemble the job, following the instruction sheet.

The boy is next taken to a partially assembled Ford engine with none but the following parts in place: Crank case, minus lower cover; cylinder block; crank shaft with connecting rods and piston assemblies; starting crank; timing gears, valves, cam shaft, and the remaining valve operating parts. In the side of the cylinder block and directly alongside the cam shaft, two rectangular holes 2½"x6½" have been made. This, This, together with the fact that the cylinder head, timing gear cover, and valve covers are not in place, brings all the valve operating mechanism into plain view. Here it is very carefully explained to the boy why he did not practice grinding valves in an engine or cylinder block—the reason for this explanation, which is never neglected, should be obvious. The importance of the complete removal of the grinding compound—after the valves have been ground—is here emphasized. The function of the valves is explained—not too technically. (This subject is taken up in lessons which follow.) The necessity of keeping the valves in proper order, i. e., grinding and replacing them in the same places from which they were removed, and ways and means to insure this, are brought out. In order that he may know the names of the valve operating parts, their location, and how they operate, he is given a Ford manual, shown the cut No. 3 on page 11, told to crank the engine, and while so doing to watch and study the moving parts.

From the foregoing it may be seen that there are three steps or stages to the job of teaching valve grinding. One in which the boy learns "what a valve looks like," and "how to operate a valve grinder;" a second in which he learns "how to determine when the valve face and valve seat are ground;" and a third in which he learns "where the valves are located in an engine," "how many valves there are," and "what causes them to open and close," or in other words "the names of the valve operating parts." The first step or stage takes at least one session, while the remaining two are usually accomplished in another session. On the completion of the job, the boy is given a job sheet together with two related sheets, one an information sheet, and another which deals with related practical arithmetic, English, safety first or hygiene—when possible—and questions which test his knowledge of the job. With these three sheets he goes to the classroom where he is given blank paper and told to proceed with the related work, which occupies about one and one-quarter hours, and which is done under the supervision and with the help of the instructor.

In order that he may know how to proceed with the job of grinding the valves in an engine when he leaves school, he is given job sheet No. 12, the shop work consisting of performing all the operations on the job sheet with the exception of actually removing the carbon—which is explained to him—and grinding the valves, which he already knows how to do. Like every job sheet this has its two related sheets, requiring further study.

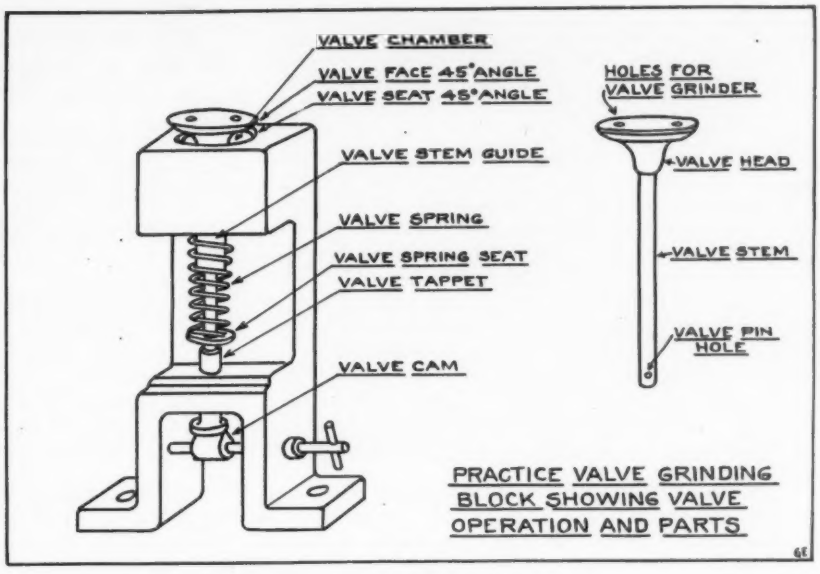


FIGURE 1. (SEE SUPPLEMENT NO. 48.)

These sheets along with others—the number depending upon the number of jobs the boy has finished—are put in loose leaf covers and make for the boy a desirable reference manual, which he is allowed to take away with him when he finally leaves the school provided he has done satisfactory work in both shop and classroom.

Now a word about the valve grinding blocks. It is evident that after a valve has been ground in one hole or seat for one and one-half hours the condition of the valve face and valve seat are such as to necessitate immediate repairs. These are accomplished by an older student who refaces the valve, takes a chip off the top of the grinding block in the shaper or lathe, refaces the valve seat and reassembles the block. It is again made ready for practice grinding, and incidentally it gives the boy practice in lathe or shaper operation and refacing valves and valve seats.

That the blocks may be refaced a great many times and still be used is proven by the fact that the six blocks made three years ago are still in use in our school and give promise of a great many more years of service. The valves, however, eventually become too small and need replacing. About 25 new Ford valves are bought each year, while used valves, suitable for practice grinding after cleaning and refacing, are picked up in the different Ford service stations.

Grinding Valves

Tools Necessary: Valve spring lifter, valve grinder, valve grinding spring, valve grinding compound, oil can.

Note: Consult blue print and follow instructions.

How to Proceed:

1. To remove valve pin or key: Put valve spring lifter under valve spring seat, squeeze lifter handles together—in this way prying up the spring—then remove pin or key from end of valve stem.
2. Lift valve out and remove valve spring and spring seat.
3. With the finger, spread a small amount of grinding compound on valve face, then with valve grinding spring under valve head, put valve back in place.
4. Using a suitable grinding tool rotate the valve on its seat, backward and forward 3 or 4 times, about one-third of the way around. THIS IS GRINDING.
5. With valve raised off its seat, move it about one-fourth of the way around to a new position, and grind as before.
6. Again raising the valve and moving to a new position one-fourth of the way around repeat the grinding operation.
7. Continue in this way—moving the valve to a new position and grinding—until the valve seat and valve face show a narrow, shiny ring all the way around between $\frac{1}{32}$" and $\frac{1}{16}$" wide remembering that if there is the slightest gap or open space in this ring, the valve will leak. *Don't* grind a deep groove in the valve face.

Note: The grinding may be started with a coarse grade of compound and finished with a finer grade.

8. Show instructor. If satisfactory, clean the valve, valve chamber and valve stem guide thoroughly, removing all grinding compound, remembering that it cuts and if left will cause damage.

9. After oiling the valve stem, replace valve, valve spring, spring seat, and pin in their places, prying up valve spring as in operation No. 1.

Valves

In *mechanics* a valve is considered to be any device which regulates the flow of gas or liquid by a movable part which opens or closes a passage. The ordinary household radiators, bicycle tires, gas pipes, and water pipes furnish common examples of the everyday use of valves and there are many other places where valves are indispensable.

Automobiles have valves in the engine for the purpose of allowing the mixture of gasoline vapor and air to enter the cylinders or combustion chambers and also to permit the burned gases to escape. Three types of valves have been used in automobile engines. (1) The rotary valve, (2) the sleeve valve, (3) the poppet or mushroom valve.

The rotary valve is seldom, if ever, used at the present time.

The sleeve valve used in the Knight engine has, despite criticism, proven satisfactory in every way. It performs its work efficiently, and at the same time almost noiselessly, while the fact that it never requires grinding, is perhaps the greatest point in its favor. These are some of the reasons for the growing popularity of cars equipped with the Knight engine.

By far the most popular type of valve used today is the poppet or mushroom type. Perhaps the main reason for this is its low cost, even though it must be replaced sooner or later, which is rarely the case with the sleeve valve. It is also much noisier in operation than the sleeve valve, although apparently just as efficient.

There are two parts to the poppet valve, the head and the stem. They may be in one piece, but the usual practice is to make the stem of a steel of good wearing quality and the head of some metal which will stand the intense heat of the combustion without *warping* out of shape. This is particularly true of the exhaust valves through which the hot, partially burned gases escape, and which for that reason are sometimes made of a different kind of metal from that of which the inlet valve is made. Cast iron, tungsten steel, and nickel steel are some of the metals used for valve heads. The heads are welded to the stems.

On the under side of the valve head, around the outer edge, is an angle, usually 45° (in rare instances 30° or 60°) called the valve face. When the valve is closed the face rests on a narrow surface of a similar angle, called the seat. These are the surfaces which are ground to prevent loss of compression.

The compression of the automobile engine has a great deal to do with its power. However, the pressure at the time of explosion is several times the compression pressure, which explains why a small loss of compression means a considerable loss of power. This loss of compression may occur around the pistons and piston rings, at the spark plugs, or through a leaky cylinder head gasket. The most common cause of loss of compression, however, is leaky exhaust valves. The inlet valves give very little trouble in this respect. The reason for this is that the inlet valve opens to allow a clean, cool mixture to pass into the cylinder, while the exhaust valve opens to allow hot and sometimes flaming gases to pass on their way out. These gases are filled with smoke and carbon, which together with the heat and some *corrosion*, cause the valves to become warped and pitted. Unless the valve is badly warped or pitted, grinding will usually restore it.

There are a great many different kinds of grinding *compounds* on the market, but the basis of them all is some abrasive or grinding substance mixed with a liquid. The two most common combinations are flour emery and oil and powdered glass and oil.

Valves

Write the answers to the following questions on the blank sheet given you for that purpose.

1. How many valves are there to each cylinder in most cars?
2. What are they called?
3. Tell in your own words the purpose of the valves.
4. Name the two distinct parts of a valve.
5. Name the surface of the valve which is ground.
6. Name the surface to which the valve is fitted.
7. How can you tell when a valve fits properly after it has been ground?
8. Why is it necessary to be so careful after the valves have been ground to remove all the grinding compound?

Write each of the following words in a sentence of your own construction.

1a. Ground (in connection with valve grinding).
2a. Compound (in connection with valve grinding).
3a. Valves (in connection with the engine).

1b. The diameter of a Ford valve stem is .309, the diameter of the hole in the valve stem guide is 5/16". Figure out how much clearance there is between the stem and the guide, for a free sliding fit.

2b. If the charge for grinding the valves (less parts) in a Ford engine is $3.50, what is the employer's net profit if all expenses are as follows:

(a) Time on job, 1½ hours at 70c per hour.
(b) Overhead expense 25% of $3.50, the charge for job.

(3b) Make out a bill to be given James E. Barton, 6 State Street, Newark, New Jersey, for the following:

Labor, grinding valves		$9.00
6 valves	@	.55 each
3 valve springs	@	.14 each
1 cylinder head gasket	@	1.25 each
3 spark plugs	@	.75 each

Grinding Valves in L-Head and T-Head Engines

Tools Necessary: Valve grinding tools (Job No. 8) with the necessary wrenches, etc.

How to Proceed:

1. Drain water system; remove spark plugs, cylinder head, cylinder head gasket and valve covers; remove carbon (Job No. 7).

2. Beginning with No. 1 cylinder "crank the engine"—using starting crank—until the piston has reached its highest point and both valves are closed, or the top of compression stroke.

3. See that there is enough space between the ends of valve stem and tappet to allow for grinding the valve; if not, lower the adjustable tappet, or in the Ford engine, *carefully* file a little off the end of the valve stem, after the valve has been removed.

4. Put each valve, as it is removed, in its proper position in valve board. This is a board in which a line of holes have been drilled 7/16" diameter and 2½" apart—each hole being numbered to correspond with the position of the valve in the engine. As the valves are removed from the engine they are placed in their proper order in the board so as to make sure that after being ground they are put back in the same holes from which they were taken.

5. Follow the method outlined above until all the valves have been removed. Now examine them for deeply pitted or grooved faces, bent heads or stems, and badly pitted or worn stems. Examine the valve seats for damaged or badly worn condition.

6. Reface valve seats and valve faces where necessary (Job No. 13) and if the condition of the valve is very bad, grind a new one in place.

7. Using a knife and a narrow strip of emery cloth, remove the carbon from valve head and stem. With a knife,

scrape the carbon from the sides of valve chamber, then blow out loose carbon, using tire pump.

8. Grind the valves (Job No. 8).

9. After all the valves have been ground and replaced according to instructions (Job No. 8), "crank the engine" and bring each piston to the highest point with both valves closed and while in this position adjust the tappets to give the proper amount of space between valve stem and tappet. The Ford valves may need a little filed off the end of the stem.

10. Replace all parts, following instructions (Job No. 7), "Installing Cylinder Head Gasket."

PRINTING DEPARTMENT PUBLICITY

Daniel Darney, Director of Manual Arts, Leominster, Massachusetts

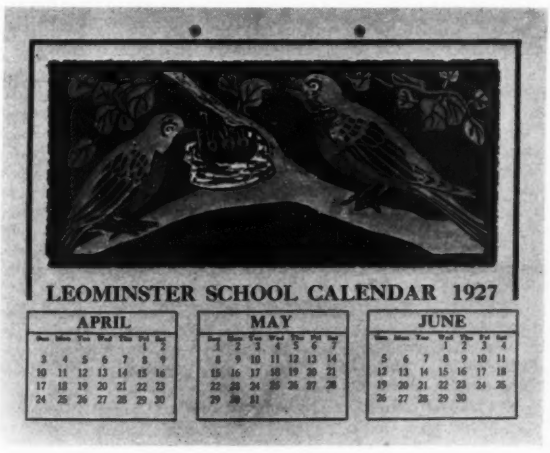
One means of giving publicity to the work of the manual arts department of public schools is to have the pupils produce something in a quantity which will allow a wide distribution of the article made. The greater the number of branches of work in the department cooperating to produce the article the better. The more pupils contributing their efforts to make the article, the greater the interest and the more successful the publicity of the standard reached in each branch. Where the department includes printing an easy means for large production presents itself.

Each year, for the past seven years, the pupils of the manual arts department of the Leominster, Mass., schools have produced a calendar. These have been printed in editions of several hundred copies with calls for more after the supply had become exhausted.

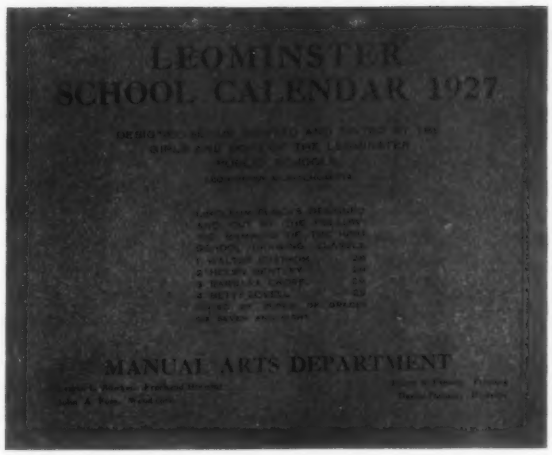
The calendar made this year is of the booklet type, and consists of four pages each bearing a cut and the dates of three months of the year, a back, and a front page. The cover is printed in black and gold on a brilliant red stock and carries information telling where the calendar was produced and the names of the pupils whose designs were selected for reproduction. This last item has developed considerable local interest in the project.

In the production of the calendar the work of pupils in the high school freehand drawing classes, the work of the pupils in the sixth, seventh, and eighth grades, and the skill of the boy printers in the school print shop are correlated.

The layout for these yearly calendars, issued at Christmas, is made by the director of the department. Typewritten instructions and suggestions with a copy of the layout are given to the freehand drawing teacher who sets the high school classes to work designing the decorative panels used on the four pages. A sheet of instructions is given the instructor of printing who has the boys set up the different months, work out the layout for the cover, and set it up.



TYPICAL PAGE OF THE CALENDAR.



COVER OF THE CALENDAR.

The high school pupils in drawing know that the best designs will be selected for reproduction on the calendar, which fact helps raise the standard of the work in these classes. When the members of the drawing classes have completed the design, the best four are chosen. These are traced to and cut from linoleum. The linoleum blocks are prepared in the woodwork classes and are ready before the designs are finished.

When the linoleum blocks are cut, they are sent to the print shop where the first page of the calendar is assembled and printed. As each page is completed the two or three hundred copies are sent to the different grade buildings where the children in the sixth, seventh, and eighth grades tint the panels in accordance with the sample page prepared in the high school. Instructions are given to the principals of each building when these tinted pages should be returned to the print shop.

By the time that all of the tinted pages reach the print shop the boys have cut the ribbon into proper lengths to tie up the calendar, and the envelopes are printed ready to receive the finished product.

The calendars are paged, punched, tied, and inserted in the envelopes for distribution.

Every year this project is started early in September, just as soon as the classes are organized, and we have been able to drop the calendars into the mails before the Christmas rush has started. To do this it is necessary to have all the necessary materials on hand before the project is started, to make careful plans, to route the work properly, and to follow the project through the various branches of the department. A definite date is set for each part of the project to be ready. If the calendar is to be finished on time, it is necessary that every step be completed as scheduled.

To avoid delay, the stock for the covers, the pages and the ribbon should be in the print shop as soon as the project has been launched. The linoleum blocks must be in the high school drawing room some time before they are needed. Extra blocks are kept on hand to avoid a delay if something goes wrong in the cutting of the panels. It is advisable to look up and to secure the envelope in which the calendar is to be enclosed before the layout is made. A dummy of the entire project is advisable.

The cover and the envelopes are printed in two colors. In printing the envelope the same set-up is used but the list of pupils who designed the different panels is removed. This allows space on the envelope for writing the address. A small card printed and tied up with the calendar suggests that the calendar is sent with the compliments of the department.

'Tis said, "It pays to advertise!" and as stated at the beginning of this article the production of a school calendar as described above is one means of giving publicitv to the work of the manual arts department.

ELIMINATING UNNECESSARY SHOP NOISES

T. P. Fiske, Teacher of Woodworking, O'Keefe Junior High School, Atlanta, Georgia

Most teachers in their teaching experience have found that in any shop where constructive work is carried on there is a great deal of necessary and unnecessary noise. This is especially true of the wood shop classes.

Where shop classes are conducted in a building where the academic subjects are taught, noise often plays an important part in the success of the shop teacher. A great number of principals who have never taught a shop class cannot realize that a class of 24 pupils must be more or less noisy, if all the boys are engaged in productive work.

When I first began teaching, I had a home room class in my shop, and not having room to place chairs, it was necessary to assign them a bench during the exercises. These boys, not being in a regular wood shop class, were always playing with the vises on the benches. My shop is equipped with vises which were originally fitted with wooden handles but, having been in use a long time, the handles had been replaced with lengths of iron pipe threaded on each end and capped to keep them in the vise screw. Every time a boy would slide this pipe through the handle, the cap would make a loud clank.

The noise disturbed me so greatly in carrying on my home room exercises that I determined to find a remedy. I secured a washer cutter, cut washers of leather and slipped these over the caps on the pipes. This reduced the noise materially, but it was rather expensive as the washers cost about four cents each and a good deal of time was used in cutting them. Besides the cost of the material, the cutter cost $1.50. I decided to try another experiment this year as a number of the leather washers had been lost or worn. I purchased four dozen rubber hose washers, at a cost of ten cents per dozen, and replaced the leather ones. I have found these effective and keep them on my vise handles all the time. This has eliminated a great deal of noise in home room periods and also in the regular shop classes.

TRADE EDUCATION OPPORTUNITIES IN MARINE CITY, MICHIGAN

The high school at Marine City, Mich., during the last two years has developed and carried out a unique type of vocational training not generally offered in a school of this size. This type of trade education work has formerly been considered feasible only in the larger schools.

Under the arrangement, the seventh grade offers the regular manual arts work; and the eighth grade offers exploratory work in carpentry, plumbing, and electricity as a means of getting the boys acquainted with different lines of trade work; in the grades above the eighth, the boys are permitted to elect one line of work from the three trades, which they are expected to pursue from one to three years. The equipment for teaching the trade course has been installed at a cost of about $1,500.

The course has attracted and held the interest of the boys who have asked that the work be continued. It has been found especially worth while from the standpoint of self-discovery, as well as from the viewpoint of homelife whether one plans to go to college or enter the other professional pursuits.

In the past, high school courses have been overcrowded with students who never should have been assigned to them. So-called vocational schools have attracted students who should be obtaining a large part of their training in the regular high school course. Hence, the school authorities have recognized the need of giving more attention to the ninety per cent and placing vocational work in the school in coordination with the regular courses. It appears that the time has come for the superintendent of schools to accept the responsibility for securing the proper balance between the vocational and regular courses.

There are obstacles in the way of a vocational program in high school. Before the acceptance of the apprentice method can become general, the educational philosophy of the people must be changed. It is now becoming pretty generally recognized that there are pupils in most schools who become bored with the so-called academic type of school work and who need outside contact. The educational diet has become concentrated and is in need of the "roughage" of trade or industrial experience. Trade education offers an opportunity during the early career of the boy to give his attention to the choosing of a life work and the earning of a living. While school authorities in the past have generally agreed that preparation for citizenship is an important function of the school, they have not so generally accepted the idea that preparation for employment is also an important function of the school. It appears that preparation for earning a living is a large contribution to good citizenship, and that vocational training has been offered in response to a definite need of present-day society.

In the midst of changing conceptions among educators and the public in general, superintendents have had to offer work which meets the approval of the parents and taxpayers. They have attempted to make a fair rate of progress without arousing controversies and without alienating large sections of the public.

AVIATION IN THE PUBLIC SCHOOLS OF KANSAS CITY, MISSOURI

I. I. Cammack, Superintendent

Aviation is becoming a popular, rapid, and safe means of transportation. Popular interest in this method of transportation is growing and the time will probably come soon when everyone should have some knowledge of this subject. It is of particular interest to Kansas City at this time and deserves greater consideration by all of our people than it at present receives.

In our manual arts work in the public schools, it is our constant effort to introduce and develop subjects that are worth while in adult life. It is our wish to discover and develop the native interests of our young people and direct them along channels that will not only develop their native abilities, but will give them an abiding interest in the subjects that are of interest to the public at large.

Since aviation is commanding such public attention, we have believed it worth while to direct and stimulate this interest among the boys and girls. We believed this could be most easily accomplished by constructing miniature airplanes and studying both the history of this means of transportation and the natural laws that must be utilized in bringing it about. Perhaps no human activity more strongly appeals to the juvenile mind than aviation.

Our manual training, which has long been in vogue, is more or less a formal and rigid subject that offers little field for constructive imagination and the development of skill in the use of natural laws. We believe the study of aviation in the elementary schools and such practical application as the making of miniature airplanes affords will develop in our boys, not only knowledge of detailed processes, but will give them constructive and practical illustrations of the methods of utilizing natural laws to specific ends, and will develop in them a desire to create. We believe that it will bring greater interest and vitality in manual arts work that manual training in its formal stages has not done.

Our method of introducing this into our public schools is by employing for the remainder of this year, Mr. Terrance Vincent, who conducted the experiments and the contest sponsored by the Rotary Club of this city. This contest created such an interest that we feel we should utilize it in the public schools. Our method is to have Mr. Vincent visit each of our public schools and instruct the teacher as well as the boys in making these miniature airplanes. In this way we can train our teachers so that the work may be continued after Mr. Vincent has left our employment. The cost of the material for the construction of these planes is very small and gives an opportunity for practical, workable construction at very little initial expense. This instruction, by the way, does not interfere with the general work of the manual training department, but is merely supplementary to it. We believe this will lead to a greater knowledge, a higher appreciation, and a more active interest in aviation than now exists. We believe this interest may be carried over into the home, and that it will materially assist the movement to make Kansas City a worthwhile air port.

Apprentice Training Course. A vocational training course for apprentices has been introduced in the high school at Harvey, Ill. The local manufacturing plants have taken advantage of the course and the work of the school dovetails into the work of the plants without conflict of any kind.

Vocational School. The school board of Council Bluffs, Ia., has approved plans for a vocational school for adults. The school will be conducted at the Union Pacific Shops two days a week. Half of the cost is borne by the school board and the other half by the Iowa State Vocational Board.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

POULTRY CRATE PEN

Fred Short, Barron, Wis.

(See Supplement No. 46)

This crate pen is of standard size and may be used for exhibiting poultry at fairs or poultry shows. It is adapted for marketing poultry as it can be easily hauled on the running board of an automobile; it may be taken down for the return trip, or used as a carrier for light supplies. The corner and center strips are 1"x2" and the sides, ends, top, and bottom are made by nailing on No. 1 lath 1½" apart. Two lath nails should be used in each lath wherever it is nailed to a corner or center strip. The ends are hinged to the top and bottom with 1½" steel butts. A center partition, if used, should be hinged to the bottom. The front and back are bolted to the ends with two ¼"x2½" bolts through the cleats at each end. This makes the pen collapsible when the front and back are removed. The center partition when used is held in place by bolts through the top center strip.

A FOLDING SCREEN

Dean Johnson, Gardner, Mass.

(See Supplement No. 47)

The folding screen shown in the drawing is much lighter, and can be more easily handled, than the usual screen. It has the added advantages of allowing the owner to change the cloth panels to wash or match surroundings.

The adjustable self-supporting curtain rods, supporting the panels, simplify the usual difficulty in screen making, of holding the cloth panels in place.

The construction of the frame work is simple and can easily be made in any manual training shop. The frames are made of ⅞"x1½" birch or maple strips and put together with dowel joints. (See drawing for details and analysis for methods of construction.)

This problem was designed for use in the domestic science departments, but has proved popular as an individual project in high school classes.

The cloth panels are made at home or in the sewing classes.

FOLDING SCREEN

Analysis

1. *Stock* for sides of each section. a. Get out 6 pieces of birch or maple to finish ⅞"x1½"x6'.

2. *Stock* for top and bottom of each section. a. Get out 6 pieces to finish ⅞"x1½"x20".

3. *Dowel Joints.* ⅜". a. Measure down from top of side pieces 2⅞" on centers, then ¾" for centers of ⅜" holes for dowels. (See blue print details.) b. From the bottom of the same pieces measure up 5⅞" on centers, then ¾" for centers on ⅜" holes for dowels. (See blue print details.) c. On each end of top and bottom cross pieces, the centers for the ⅜" dowels are ¾" down, then ¾" on centers.

Note: It is a good policy to make and use jigs for boring the holes. This insures accuracy and saves time.

4. *Chamfer* 3/16" or mould out 3/16" quarter round on edges that will come on the inside of the screen sections (when assembled as shown on blue print).

5. *Dowels.* Birch. a. Cut number required 1⅜" long.

6. *Assemble*—Sections. a. Use cold glue in holes and on dowels. b. Pull up sections of screen straight and square with steel bar-clamps, using blocks under ears to prevent marking. c. Test frame for squareness and buckling.

7. *Setting Double Acting Hinges.* a. Clamp all section frames together. b. Square across edges of sections at where ends of hinges will be—mark with knife. c. Mark depth of mortise ½ thickness of the hinge, with marking gauge. d. Location for hinges as shown on blue print. e. Screw hinges in place.

Note: The middle section will have to be mortised for hinges on both sides.

8. *Scrape out all mill plane marks, etc.* a. Sandpaper with No. 1, finish with ½. Wax finish.

9. *Finish:* Walnut or mahogany. a. Stain. Use spirit or water stain. b. Dry 12 hours. c. Shellac—thin with alcohol—apply quickly, one piece or part at a time. Do not lap—let dry 2 hours. d. Sand lightly with 00 sandpaper, being careful not to touch corners. e. Apply wax with a damp soft cloth. Let set about five minutes and polish with a dry, soft cloth.

10. *Adjustable Self-Supporting Curtain Rods* to support cloth inside of section frames should be fitted as necessary.

Bill of Material for Folding Screen Frame

6 pieces	⅞"x1½"x6' birch	at	per Bd. Ft.
6 pieces	⅞"x1½"x20" birch	at	per Bd. Ft.
24 pieces	⅜"x1⅜" dowels	at	per Ln. Ft.
6	adjustable self-supporting curtain rods	at	Each
6	double acting hinges, ⅞"x1¾"	at	Each
½	pint stain	at	per Gal.
½	pint shellac	at	per Gal.
½	pint paste or liquid wax	at	per Lb.
	Sum		$.
10	per cent for overhead		
	Total		$.

HOW TO MAKE A LAYOUT OF A WINDING FOR A SPLIT-PHASE OR A REPULSION-INDUCTION MOTOR

Geo. A. Willoughby, Saginaw, Mich.

Directions: 1. Count the number of slots (assume for example, 24). 2. Determine the number of poles. This will depend upon the speed as indicated by the following table:

Speed on 60-Cycle Current	Number of Poles
3600 r. p. m.	2
1800 r. p. m.	4
1200 r. p. m.	6
900 r. p. m.	8

If the current is 25-cycle, the speeds will be 25/60 of the above. And if the frequency is other than 25 or 60, represented by F, the speeds in the above table will be F/60 times those given.

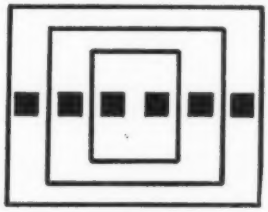


FIGURE 1.

3. Divide the number of slots by the number of poles. (Assume, for example, that there are 24 slots and that the speed is to be 1800 r.p.m. on 60-cycle current. Then divide 24 by 4 which will give 6.)

This number will give the span of the outside coil of each pole group. (That is for the example taken, the outermost coil of the pole group will be in slots one and seven. There will be sides of two different pole windings in the first, seventh, thirteenth, and nineteenth slots.)

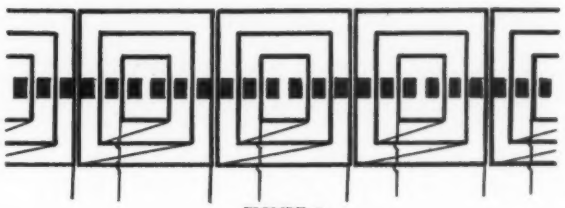


FIGURE 2.

4. Draw on a suitable sheet of paper spaces to represent the core teeth and the slots for a pole. The number of core teeth will be equal to the number determined in Step 3. These teeth may be represented by black squares and the space between them used to represent slots. (For the example there will be six black squares. See Fig. 1.)

5. Draw a rectangle as in the illustration through the outermost slots to represent the outer coil. Then draw a second rectangle through the next two slots inward from each side; then through the next two; and so on until the center is reached.

This diagram will show how the coils will lie in the frame. All of the coils will be similar to this one.

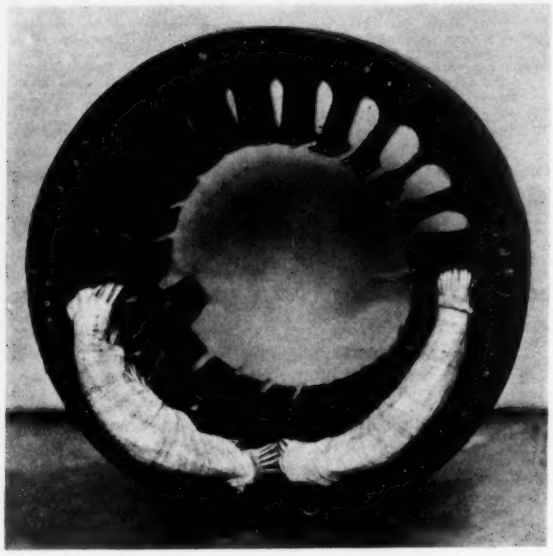


FIG. 3. TWO POLE GROUPS WOUND.

The complete diagram of the winding, as calculated for the 24-slot, four-pole machine, is illustrated in Fig. 2.

The motor frame with two of the pole groups wound is shown in Fig. 3, and a bottom view of the winding is shown in Fig. 4. Note how the winding is taped after it has been put on.

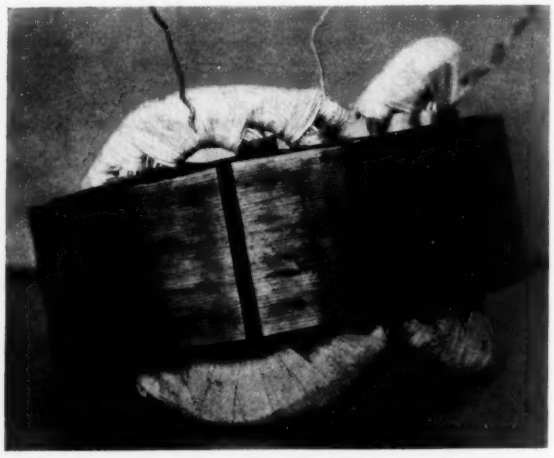


FIG. 4. WINDING COMPLETED AND TAPED.

THE DAILY CHECK-UP FOR WOOD SHOPS

Jas. I. Anderson, B.S., Instructor of Woodwork at Mt. Vernon Junior High School, Los Angeles, Calif.

It has been the experience of the writer that some system should be devised by which the instructor could have a daily check-up on each student, for the work done, materials used, and a student record of conduct, together with some uniform system of grading work. To meet this situation the writer adopted a *time card* system, such as is used by certain commercial firms with modifications of course for school use. I have given this system a fair trial and have found that it meets the above requirements in a very simple yet effective way.

The following is a sample of the card I use:

On the reverse side is printed the following:

The card is about 5″x7″, printed on stiff paper. Near the door I prepared a card-rack by cutting slots in a 2″x6″ at an angle of 45° on the circular saw, spacing the slots about ½″ apart. Each slot is numbered to correspond to the bench

No._____ **Shop Record** Job No. _____

Mechanic _____ Class_____ Period_____ P'd_____

Project _____ Customer _____ Cost Ch'g_____

Date	Work done each day	W	A	S	D	Q	P	Totals

W - Workmanship A - Accuracy S - Speed D - Drawing Q - Question P - Penalty Copyrighted 1926 J. I. Anderson

FRONT OF SHOP CARD.

number of the student. On the back of the bench of each student I drove a nail on which he hangs his card while in class. Upon entering the room each boy takes his card from the rack and hangs it on the nail until the close of the class, at which time he writes a brief description of the work accomplished that day, also what materials used, and drawings made, if any.

When the job is completed, the project is graded according to the above standard, and the card filed in a card index box for reference. A new card is given for each job. Occasionally it is necessary to check students for carelessness, dirty benches, etc. Under "P" I give him a mark calling *his* attention to the fact and *my* attention when I check up for final grades.

STOCK BILL

Location	No Pieces	Thickness	Width	Length	Kind of Lumber	Board Feet	Price per Foot	Cost
Totals								

OTHER MATERIAL

Kinds	Quantity	Cost	Total

Mount Vernon Press, Los Angeles

REVERSE OF SHOP CARD.

In summing up I find this system is effective for the following:

1. It saves time in calling roll. (The students whose cards are in the rack are absent.)
2. It acquaints students with commercial practices.
3. It provides a permanent record for time, lumber, and materials used.
4. The teacher can grade daily if he desires.
5. It has a good psychological effect on the student for each day he must ask himself "What have I done today?"
6. It helps to speed up work. There is not that tendency to "kill time."
7. The teacher may know what each student has done each day.
8. It is an effective means of checking violations of shop rules.
9. It is a means of establishing habits of neatness, accuracy, and system.

There are probably other things that might be said of this system in its favor, but the above are some of the outstanding features and as such I pass it on.

DRAWING PROBLEMS FOR EVENING CLASSES

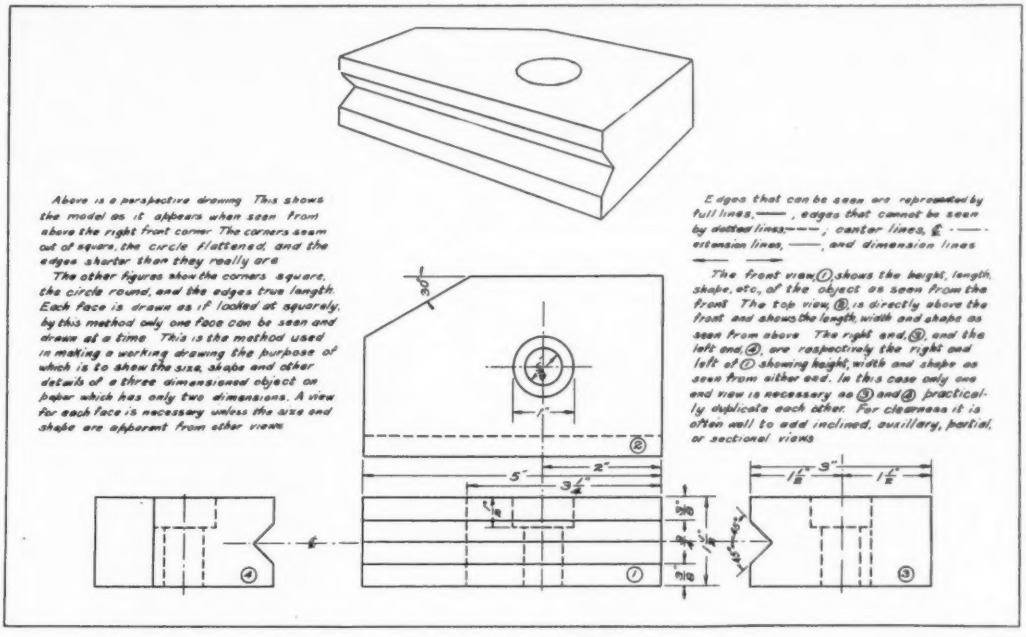
J. G. Childs, Sheboygan, Wis.

The accompanying drawings illustrate methods that have given satisfactory results in evening classes. Evening classes differ from day classes in several respects. First they have quite definite ideas about what they want; they know when an instructor is stalling, and they are impatient of anything that stands in the way of accomplishment.

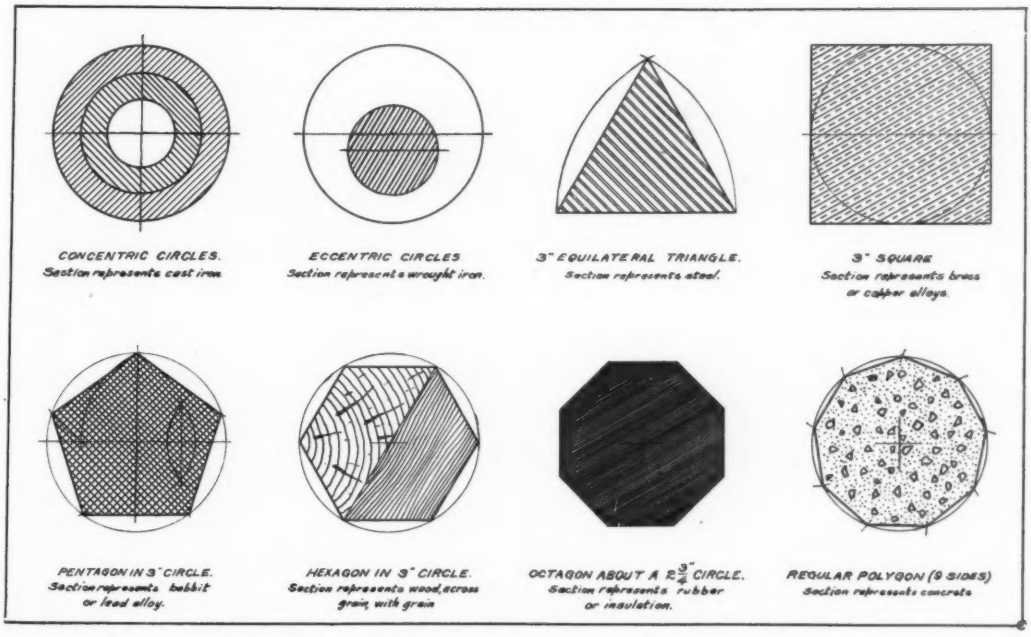
Notwithstanding all that has been said about "exercise projects" every teacher knows that good work cannot be done without practice in the use of tools. It makes no difference whether the instructor calls this practice "exercise" or something else; if he gets results he puts the practice over in one form or another.

The purpose of the first drawing is to put over the old "line exercise" in a manner that will not kill interest. The titles acquaint the student with several common geometric terms. The preliminary layout by construction, tee square and triangles, and by spacing is used in drawing the figures. This acquaints the pupil with several methods of construction and suggests means by which he can work out problems for himself. The sectioning gives him practice in the use of square and triangles, and spacing by eye, and he becomes familiar with the conventional representations of materials used in construction.

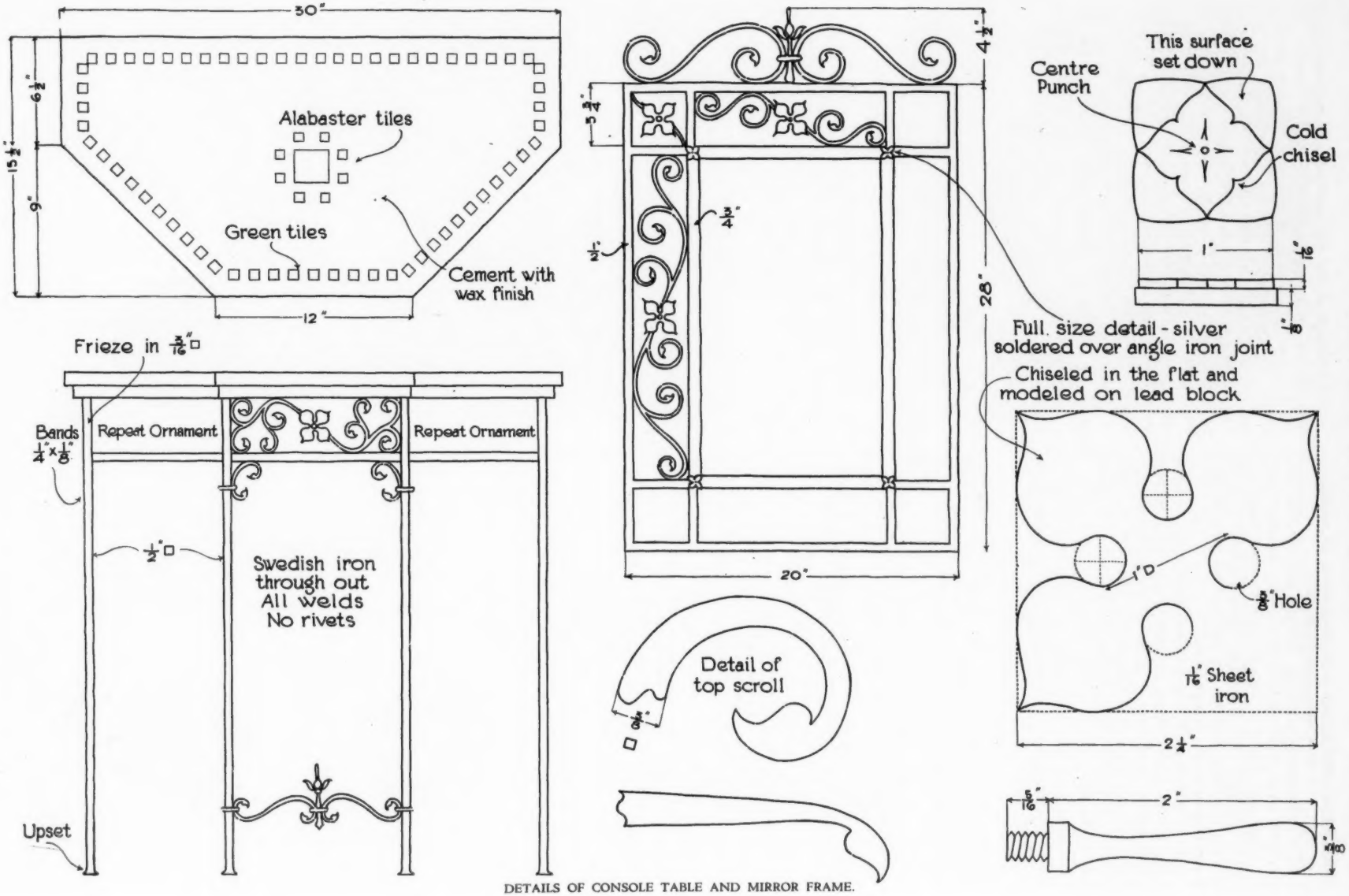
The second drawing is an effort to show concisely and clearly the purpose of a working drawing. It shows why


Above is a perspective drawing. This shows the model as it appears when seen from above the right front corner. The corners seem out of square, the circle flattened, and the edges shorter than they really are.
The other figures show the corners square, the circle round, and the edges true length. Each face is drawn as if looked at squarely, by this method only one face can be seen and drawn at a time. This is the method used in making a working drawing the purpose of which is to show the size, shape and other details of a three dimensioned object on paper which has only two dimensions. A view for each face is necessary unless the size and shape are apparent from other views.
Edges that can be seen are represented by full lines, ——— , edges that cannot be seen by dotted lines, - - - - , center lines, ℄ · — · — · , extension lines, ——— , and dimension lines ——— ———
The front view, ①, shows the height, length, shape, etc., of the object as seen from the front. The top view, ②, is directly above the front and shows the length, width and shape as seen from above. The right end, ③, and the left end, ④, are respectively the right and left of ① showing height, width and shape as seen from either end. In this case only one end view is necessary as ③ and ④ practically duplicate each other. For clearness it is often well to add inclined, auxillary, partial, or sectional views.
1"
2"
5"
3½"
1⅛"
3"
1⅛"
①
②
③
④

COMPARISON OF PERSPECTIVE AND WORKING DRAWINGS.


CONCENTRIC CIRCLES.
Section represents cast iron.
ECCENTRIC CIRCLES
Section represents wrought iron.
3" EQUILATERAL TRIANGLE.
Section represents steel.
3" SQUARE
Section represents brass or copper alloys.
PENTAGON IN 3" CIRCLE.
Section represents babbit or lead alloy.
HEXAGON IN 3" CIRCLE.
Section represents wood, across grain, with grain
OCTAGON ABOUT A ℇ 3" CIRCLE.
Section represents rubber or insulation.
REGULAR POLYGON (9 SIDES)
Section represents concrete.

TYPICAL PLATE OF GEOMETRIC FIGURES, SECTION CONVENTIONS.



DETAILS OF CONSOLE TABLE AND MIRROR FRAME.

perspective is unsuited for working drawings. The necessity for more than one view, the relation of views, the uses of different kinds of lines and dimensioning are only briefly outlined, the idea being to tell only enough to help the student find his own way. After studying the drawing, and the model from which it was made, the student is asked to sketch the model without the use of the drawing and to answer such questions as seem pertinent to the instructor. After the obscure points are cleared up, the student is asked to make the necessary corrections or to explain his reason for any line drawn. He does this willingly because he realizes that he must correct his weaknesses. This is the first lesson in projection; when it has been mastered, the student draws from a series of models or machine parts, beginning in the usual way with straight line objects, and progressing as his ability permits to the more difficult parts and assembly drawings.

Neither of the above has been tried for class instruction. The original purpose was to hold interest in evening classes where, owing to withdrawals, new enrollments, and differing abilities, the work is almost entirely individual.

A CONSOLE TABLE, MIRROR, AND CANDLESTICKS

Paul Medary, Newtown, Pa.

The entire problem is done in Swedish wrought iron, which being much softer than American irons, is more readily worked and less liable to split in the forging.

The two ¾" angle iron frames forming the top are an excellent key for the cast cement top. This top has been finished with a slightly waved surface giving the appearance, when waxed, of a piece of old leather.

CONSOLE TABLE, MIRROR, AND CANDLESTICKS.

All iron has been forged with the flat of the hammer before bending in order to eliminate the commercial rolled finish.

No rivets have been used—all unions being welded or silver-soldered.

The final metal finish is obtained by the use of emery cloth to bring out the high lights, then is gone over with machine oil, and wiped off dry.

In no other way can the real beauty of the iron be preserved.

Many finishes are used to prevent oxidation, such as boiled linseed oil, beeswax, spar varnish, and many other coatings, but all of these detract greatly from the beauty of the rubbed iron, while a film of heavy oil that cannot be detected and will not soil anything coming in contact with it, will prevent rust almost indefinitely. However, it is good practice to clean iron work when dusting with a slightly oiled cloth.

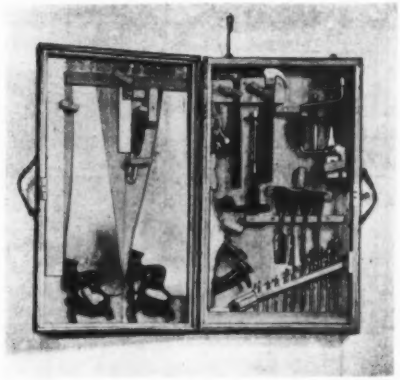
All our school work in craft iron is from original designs, worked out in the shop by the instructor in the presence of the pupil, and it is seldom that we duplicate any designs a second term. Our policy is to have under construction by one class a number of problems covering a comprehensive field in wrought iron possibilities, and to see that every boy is shown those problems in his classmates' work that do not appear in his own.

In explanation of the above, it might be well to state that this work is being taken up in our mechanic arts course and not in the industrial, and that our interpretation of a mechanic arts course is one that shall make a boy versatile in a great many mechanical lines rather than cunning in one; make him able to discuss intelligently the possibilities in mechanics and to use such information in engineering work, in salesmanship, or in his contact in any capacity with those who are deriving their livelihood from mechanical work.

THE HANDIEST FARM SHOP TOOL CASE

F. L. Fleming, Douglas, Wyo.

This handy case hangs on the wall or it may be carried to the field. The tools are always in their place and can be obtained with the greatest ease at any time. The usefulness of such a case is apparent. When a boy on the farm, some implement would break in the field and I would be sent to



THE TOOL CASE OPENED UP TO SHOW CONTENTS.

the barn for some tool. Often when I arrived with it, another would be needed and I would make another trip. It was during such trips that I conceived the idea that a case should be ready with a nice kit of tools in it for repair jobs in the field. This case could be kept with the hay machinery or other field machinery during the season of its operation.

This particular case is made of soft pine, but any good wood may be used. It is 29½" long, 16½" wide, and 3"

deep. The stronger it is put together the better. One-half inch wood is preferred for the edges and five-eighths to three-fourths inch for the sides. The edges are double. Dovetailing the inside pieces makes a strong corner and mitering the corners is nice for the outside pieces.

All corners are protected with corner pieces of metal cut from medium gauge galvanized iron. These are put on with screws.

The handle is double, one part on each half of the box. The little irons are cut from medium sheet iron and bolted on. The leather is sewed to these with tin in the turn for protection. All parts are hand made except the hinges and lock. The tools are held in place by little knobs that turn, or by leather holders.

This case was made for a model for boys in vocational agriculture shop classes. This set contains thirty pieces with which any simple farm repair work or building can be done. Where possible these should be supplemented with tools for leather, tin, and iron work, and the other common tools of heavier nature.

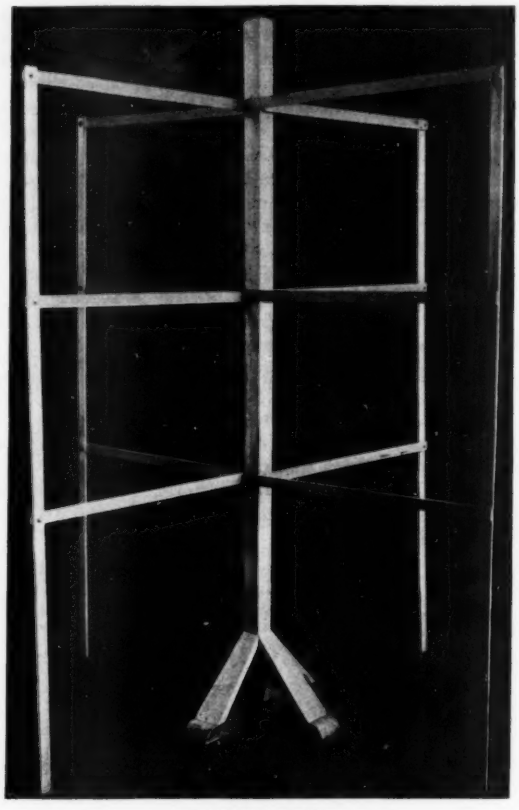
The tools making up this set are as follows:

Rip saw
Cross-cut saw
Compass saw
Carpenter's square
Try square
Bevel T square
Jack plane
Block plane
Claw hammer
Riveting hammer
Cold chisel
Punch
Nail set
Wood chisels, 3/8", 1/2", 3/4", 1 1/4"
Brace
Drills, 3/16", 4/16", 5/16", 6/16", 7/16", 8/16"
Auger bits, 10/16", 12/16", 14/16", 1"
Screw driver
Draw knife

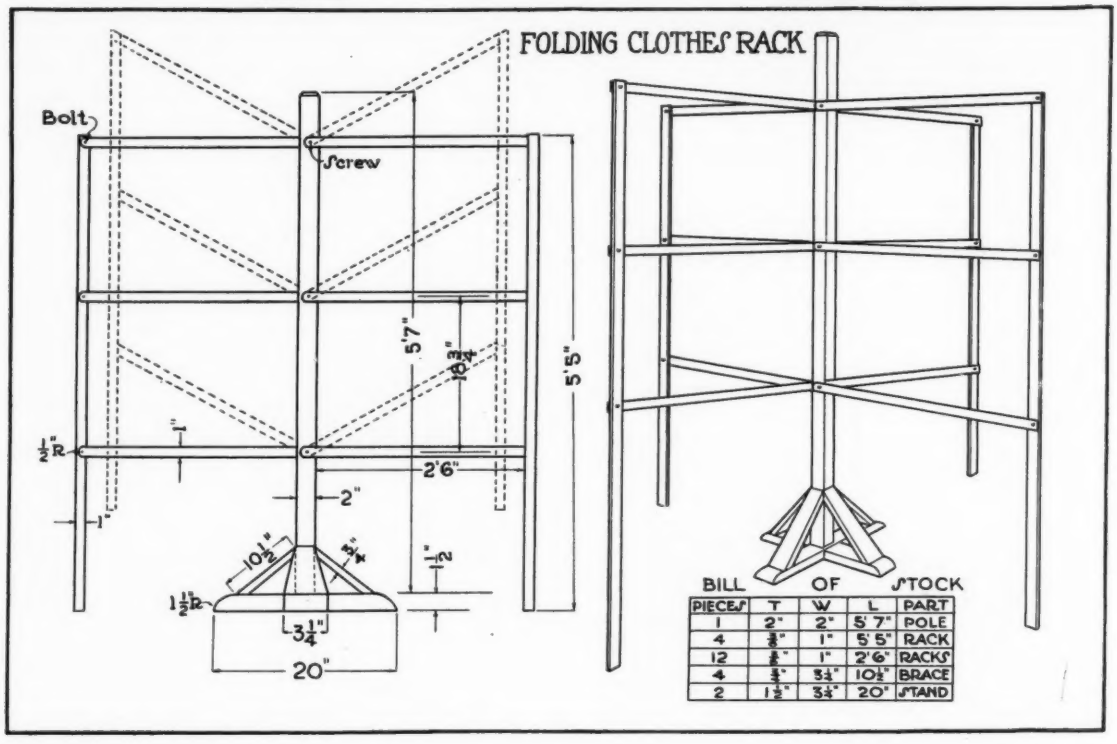
A CLOTHES RACK

John M. Bice, Junior High School, Fort Dodge, Iowa

This clothes rack is made to use where space is limited. As many arms can be used as necessary, and when not in use, can be closed and placed in a corner.



CLOTHES RACK.



It is a fine problem for the junior high school and very inexpensive to make, the cost being less than one dollar. It can be made from soft wood, finished with two coats of shellac.

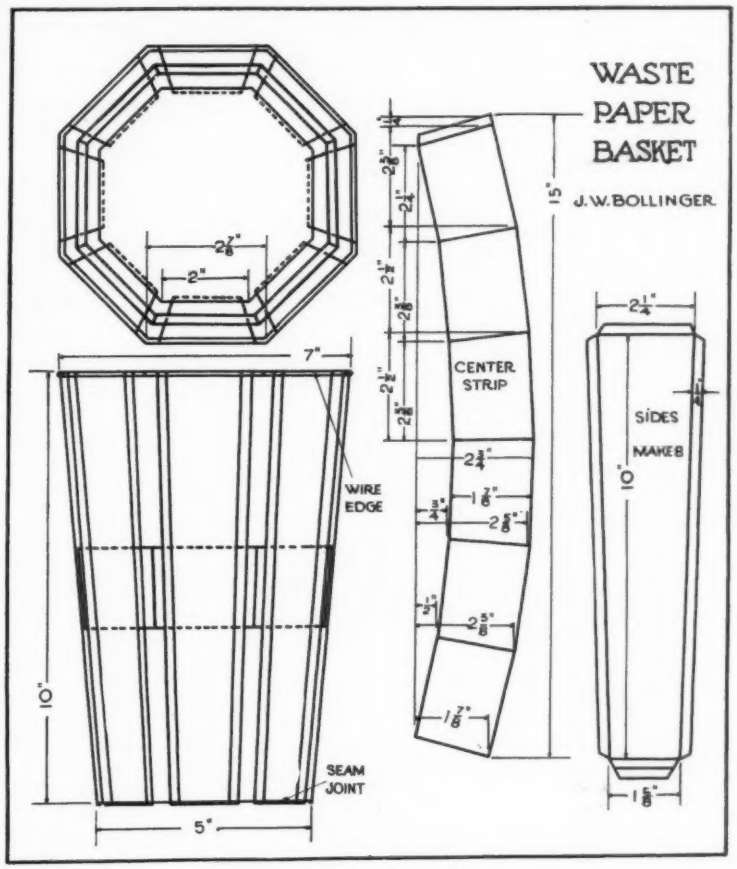
WASTE PAPER BASKET

J. W. Bollinger, Roosevelt Junior High, Tulsa, Oklahoma

Here is one way of making a fairly large project of small pieces of IX tin plate. The bottom can be made out of a 5½" square, and there are eight sides, each 2¾" by 10¾". The center strip is 2¾" by 15". The sides shown in the drawing are tapered, with hems along the sides. This is a rather plain design, which may be enhanced by diamond-shaped openings cut in above and below the center strip. Or a series of various-sized holes may be punched. The sides might be cut to some curved pattern in place of being tapered.

The sides are seam-jointed to the bottom; held together at the top by a wire edge; sweat-soldered; and are held in the center by a center strip, riveted or soldered in place. If this center strip is made to fit an octagon of the same size as the bottom, and fastened in the center, the waste basket will then flare out pleasingly toward the top. For geometric "fun," baskets having five, six, or seven sides may also be worked out.

Still more opportunity for individual preference is offered if the baskets are given a coat of enamel, with the possibility of doing some enamel-design work on the sides.

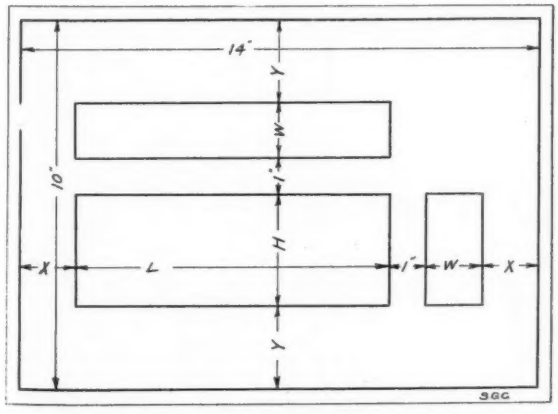


DETAILS OF WASTE PAPER BASKET.

LOCATING THE DRAWING

S. Grant Conner, Harding High School, Woodlawn, Pa.

One of the first questions asked by students in the drafting room is, "Where shall I place the drawing?" This important question may be answered in several ways, with varying degrees of educational growth on the pupil's part. The instructor may figure the location himself and give it to the class, or he may say, "Figure it out for yourself." The first method is not practical in the majority of classrooms, as most of the class are on different jobs and the instructor would have little time for anything else. The latter is inefficient in that the student will waste a great deal of time attempting to locate his drawing properly. Wouldn't it be best to make it a problem in practical mathematics? In this method, the class would have a real use for mathematics and a correlation of the subjects would result.



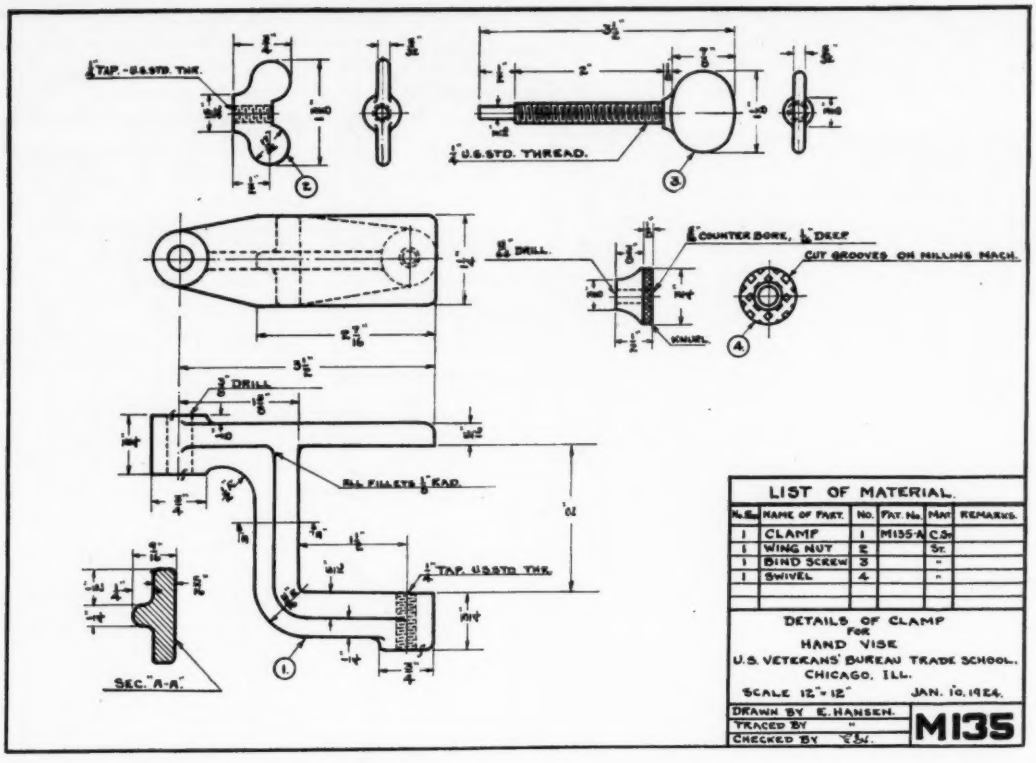
DETAILS FOR LOCATING DRAWINGS.

The author has used the following method in his classes for several years with a great deal of success. The accompanying sketch and formulae are placed on the blackboard and thoroughly explained to the class. The derivation of the formulae from the sketch is made clear, and as a result, the student never has occasion to ask the questions mentioned above.

(1) $X=\frac{14-(L+1''+W)}{2}$ (2) $Y=\frac{10-(H+1''+W)}{2}$

L Length of front view.
W Width of end view.
H Height of front view.
1" Distance between views (variable).
14" Length of working area (variable).
10" Width of working area (variable).

To solve the formulae substitute, the values for "L," "W," and "H" and solve as indicated by the symbols. In the case of scale drawings the actual measurements are determined for the size of the views and substituted in the formulae. The formulae are then solved and the accurate locations are found with little trouble. The few minutes required to put this method "across" to the students is well spent and the majority of boys of junior high school age are able to grasp and apply it at once. With this problem taken over by the pupils themselves the instructor has more time available for his more important work of teaching.

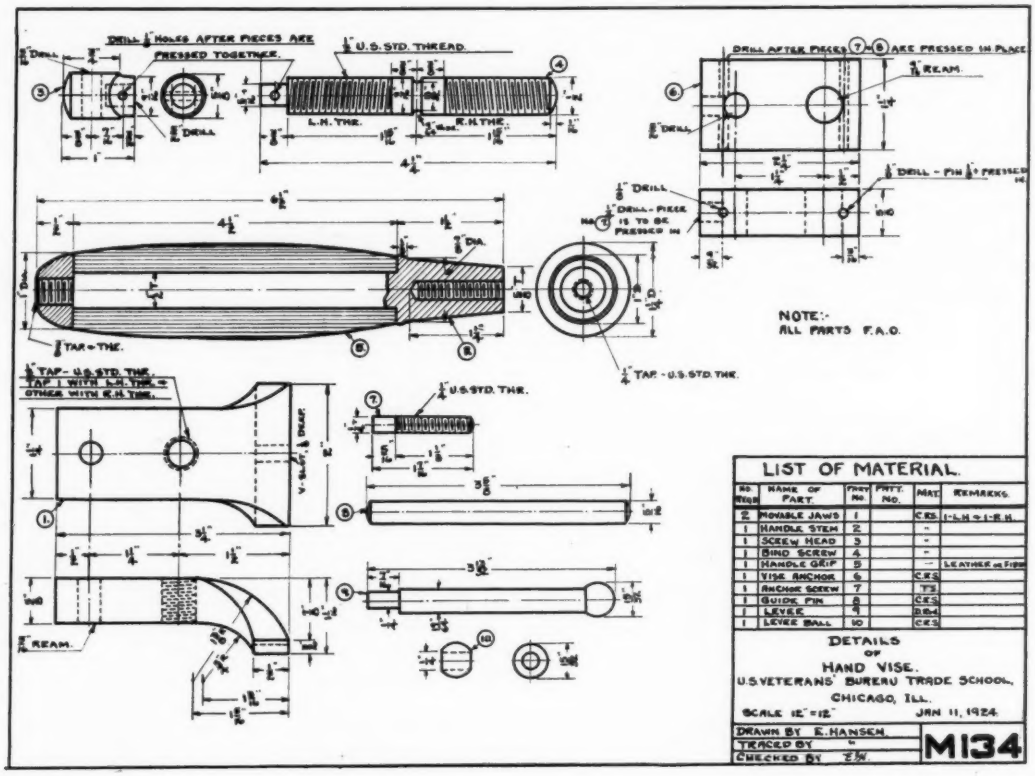

TAP - U.S.STD. THR.
U.S.STD. THREAD.
DRILL
COUNTER BORE, DEEP
CUT GROOVES ON MILLING MACH.
KNURL
ALL FILLETS RAD.
TAP. U.S.STD. THR.
SEC. "A-A"
LIST OF MATERIAL.
No. | NAME OF PART | No. | PAT. No. | MAT. | REMARKS.
1 | CLAMP | 1 | M135-A | C.S. |
1 | WING NUT | 2 | | Br. |
1 | BIND SCREW | 3 | | " |
1 | SWIVEL | 4 | | " |
DETAILS OF CLAMP FOR HAND VISE
U.S. VETERANS' BUREAU TRADE SCHOOL, CHICAGO, ILL.
SCALE 12"=12" JAN. 10, 1924.
DRAWN BY E. HANSEN.
TRACED BY "
CHECKED BY E.H.
M135

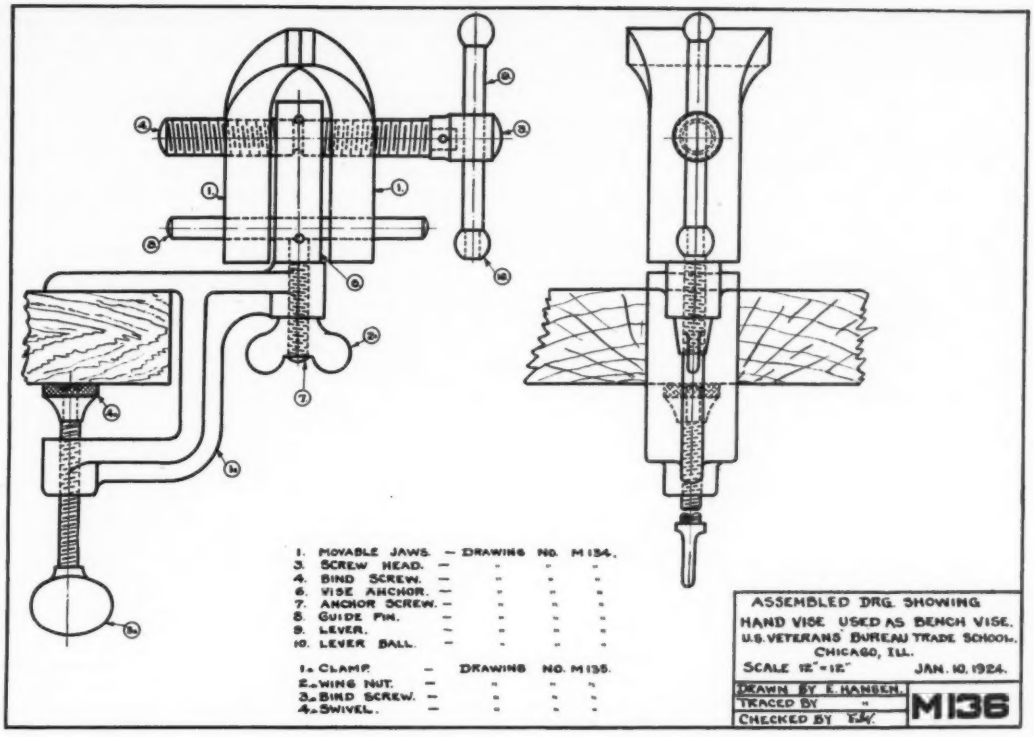
A COMBINATION HAND VISE

Elmore G. Hansen, Marquette, Mich.

The drawings show a combination hand vise which was made in the United States Veterans' Bureau Trade School in Chicago.

The vise is made with a clamp, permitting its use as a small bench vise. It is a tool, the utility of which will readily be recognized by mechanics, as well as those working in the school shop, or around the home. By removing the handle and substituting the clamp, the tool may be fastened to the


DRILL HOLES AFTER PIECES ARE PRESSED TOGETHER.
U.S. STD. THREAD.
L.H. THR.
R.H. THR.
DRILL AFTER PIECES 7 & 8 ARE PRESSED IN PLACE
REAM.
DRILL - PIN PRESSED IN
DRILL - PIECE 8 TO BE PRESSED IN
TAP - THR.
TAP - U.S.STD. THR.
NOTE:- ALL PARTS F.A.O.
TAP - U.S. STD. THR. TAP 1 WITH L.H. THR. & OTHER WITH R.H. THR.
U.S.STD. THR.
REAM.
LIST OF MATERIAL.
No. Req'd | NAME OF PART. | PART No. | PATT. NO. | MAT. | REMARKS.
2 | MOVABLE JAWS | 1 | | C.R.S. | 1-L.H. & 1-R.H.
1 | HANDLE STEM | 2 | | " |
1 | SCREW HEAD | 3 | | " |
1 | BIND SCREW | 4 | | " |
1 | HANDLE GRIP | 5 | | — | LEATHER or FIBRE
1 | VISE ANCHOR | 6 | | C.R.S. |
1 | ANCHOR SCREW | 7 | | T.S. |
1 | GUIDE PIN | 8 | | C.R.S. |
1 | LEVER | 9 | | D.R.H. |
1 | LEVER BALL | 10 | | C.R.S. |
DETAILS OF HAND VISE.
U.S. VETERANS' BUREAU TRADE SCHOOL, CHICAGO, ILL.
SCALE 12"=12" JAN 11, 1924.
DRAWN BY E. HANSEN.
TRACED BY "
CHECKED BY E.H.
M134


1. MOVABLE JAWS. — DRAWING NO. M 134.
3. SCREW HEAD. — " " "
4. BIND SCREW. — " " "
6. VISE ANCHOR. — " " "
7. ANCHOR SCREW. — " " "
8. GUIDE PIN. — " " "
9. LEVER. — " " "
10. LEVER BALL. — " " "
1. CLAMP. — DRAWING NO. M 135.
2. WING NUT. — " " "
3. BIND SCREW. — " " "
4. SWIVEL. — " " "
ASSEMBLED DRG. SHOWING
HAND VISE USED AS BENCH VISE.
U.S. VETERANS' BUREAU TRADE SCHOOL.
CHICAGO, ILL.
SCALE 12"=12" JAN. 10, 1924.
DRAWN BY E. HANSEN.
TRACED BY "
CHECKED BY
M136

bench or shelf, having an appropriate thickness of ½" to 1½". The vise may be adjusted to different positions to meet the need of the operator. When used as a hand vise, the leverage obtainable with the ball and handle will be appreciated in comparison with the wing nut so commonly employed for this purpose.

The vise was drawn and made by a man whose job objective is the machinist trade. After completing the working drawings, the parts were made in the machine shop with the exception of the clamp, which required some machine work. A pattern for the clamp was made and a steel casting cast in the mould made by the pattern.

This proved an interesting project because of the various types of work required and because it is a useful tool for those who take the machine shop course. It is an interesting project for any high, trade, or vocational school.

A B C D E F G H I
J K L M N O P Q
R S T U V W X Y Z
a b c d e f g h i j k l m n
o p q r s t u v w x y z

AN INTERESTING ALPHABET DESIGNED BY ED HUNT AND W. BEN HUNT, MILWAUKEE, WIS.

THE MANUAL ARTS CONFERENCE

The Seventeenth Manual Arts Conference was held on December 9th, 10th, 11th at the Reynolds Club, University of Chicago. The conference was well attended and the success of the meetings was due to the regular attendance of every member.

The General Chairman, William T. Bawden, Associate Superintendent of City Schools, Tulsa, Okla., who opened the conference, turned the first meeting over to the chairman, Mr. Hans W. Schmidt, of Madison, Wisconsin. The advantages and disadvantages of offering two distinct curricula for industrial education directors and manual art directors was discussed by Fred C. Whitcomb, Miami University; D. J. Crowley, State Teachers' College, Bowling Green, Ohio; M. J. Laubach, State Teachers' College, Terre Haute, Indiana; and George B. Cox, University of Wisconsin. The consensus of the group was that a composite curriculum is better for both phases of the work in that there is an over-lapping of work. Definite types of instruction could be given with emphasis properly placed. An insight into both fields enables a teacher to adjust himself and aids him if his work calls for both types of instruction.

The second meeting was presided over by Mr. Charles A. Bennett, Editor Industrial Education Magazine, Peoria, Ill. Reports on the progress of plans for the preparation of teachers of manual and industrial education were presented by T. T. Lindsey, Peabody College for Teachers, Nashville, Tenn.; Homer J. Smith, University of Minnesota, and Victor Randel, State Teachers' College, Huntsville, Texas.

A most interesting meeting was held in the evening of the opening day. The topic, "How Can the Teacher-Training Institution Help the Prospective Teacher Cultivate Desirable Personal Traits?" by Arthur B. Mays, University of Illinois, presented an exceptional contribution in that it was filled with personality. Mr. Mays related several means of getting at the teacher who needs to know desirable personal traits. A. F. Siepert, Bradley Polytechnic Institute, gave a valuable contribution in his talk on "Desirable Traits and Ideals of Teachers." Charles H. Bailey, State Teachers' College, Cedar Falls, Iowa, presented, "Selection of the Instructional Staff of a Teacher-Training Institution in Terms of Influencing the Personality of the Teacher." Speaking pointedly, Mr. Bailey said, "Those who employ such persons should make a careful study of the personal traits desirable in teachers in order to be certain as to what traits to insist upon in those they employ." William H. Stone, Ohio State, said "Teacher training institutions can help the prospective teacher cultivate desirable personal traits by making possession of desirable traits a *major objective* in teaching instead of considering it as incidental, or a by-product." Chairman James McKinney, American School, called these desirable traits "things of the heart."

Mr. Arthur B. Mays, University of Illinois, closed the meeting with a summary of the discussion and in his report suggested more "cross-fire," more "give and take." The suggestion was well taken for the next day's discussions, on "Some Problems of Individual Instruction in the Shop" and "Individual Instruction Sheets" brought forth a "deadlock." Pros and cons were almost divided. The famous huddle system was almost needed, but Chairman J. W. Paul, State Board for Vocational Education, Springfield, Illinois, called on Robert W. Selvidge, University of Missouri, and dean of the conference. Mr. Selvidge, being well grounded in the various types of sheets, succeeded in gaining ground and giving out information but not in the form of sheets. Much of the discussion arose over the names for the individual instruction sheets. It was agreed that whatever type of sheet was selected must be used as a teaching aid and that they would be more or less individual in character. It was suggested that teacher-training institutions should give some instruction on the making of the sheets and their use in the school. The opinion was that the sheet would eliminate simple questions, such as "What shall I do next?", and that they would save time for boys who had a question answered on the sheet. "Individual instruction was advocated by Solomon in his early teaching," said Charles H. Bailey. A contribution was made by H. T. Wilhite, State Normal School, Muncie, Indiana, in the form of an Information Sheet on Window Glass. His contention was that it is easier for a boy to get such information through sheets, but that every boy should know how to find information in books.

The discussion on "Objectives of the Home Mechanics Shop" was led by William E. Roberts of the City Schools, Cleveland, Ohio. Some 64 hours of work were represented in the report of Mr. Roberts, which was one of the valuable contributions of the conference. Quoting briefly from his remarks, "There must be a general statement of ideals to be attained. They must be realized, if at all, through the development of character building elements, defined in inclusive terms as moral, mental, social, aesthetic, and physical qualities. Attainment is primarily a result of method, and only incidentally a result of subject matter. They are of necessity intangible, difficult of concrete expression, and difficult or impossible of measurement and evaluation. They are vastly important, the most important of the teachers' aims of accomplishments. There should be no attempt to cover all, or even a large part, of these ideals in a single course. Every lesson should consciously strive for achievement in one or more."

The general discussion on the preparation of teachers for the general shop, was an interesting topic. Victor Randel, State Teachers' College, Huntsville, Texas, and D. J. Crowley, State Teachers' College, Bowling Green, Ohio, presented papers on "The preparation of teachers for the general shop from the standpoint of professional equipment." Mr. Crowley gave some statements as to the purposes of instruction in the general shop. 1. To develop a discriminating understanding of the industrial environment. 2. To develop consumers' intelligence and appreciation. 3. To develop handy-man values. 4. To develop a knowledge of industrial processes. 5. To give vocational guidance. 6. To provide a pre-vocational training.

The training of teachers in service was discussed by Mr. Hans W. Schmidt of the State Department of Education, Madison; C. S. VanDuesen, State Teachers' College, Kent, Ohio; Robert W. Woellner, University of Chicago, and O. B. Badger, Purdue University, Lafayette, Indiana.

The last session took up practical problems in shop planning, types of machinery, and equipment. The prospective teacher should know how to purchase good machinery, be able to plan for additional expansion, and to provide adequate equipment for doing good work. A. F. Siepert, Bradley Institute, and G. E. McLaughlin, Ohio University, made this an interesting meeting. This work is recognized as important in the training of teachers, if the teacher is to be promoted from the ranks to director of the work in manual or industrial arts.

The meeting proved to be another step toward better teaching and better equipped teachers. General Chairman, William T. Bawden deserved much credit for the progress of the conference and for his ability to make up programs. The next annual meeting will be held in Chicago, with headquarters at the Del Prade Hotel.

Emerson William Manzer.

THE TULSA MANUAL ARTS CLUB

The Tulsa Manual Arts Club of Tulsa, Oklahoma, at its recent meeting, displayed an attractive membership roster and schedule of meetings. The roster and schedule were worked out under the direction of Mr. G. B, Willett, president of the club, and the printing was done in the high school print shop, under the direction of Mr. W. W. Graham. The folder contains the names of Supt. P. P. Claxton, Associate Supt. W. T. Bawden, and the names of the state officers of vocational education.

The December meeting was well attended, all members except one being present. In addition, there were present Mr. Herbert Detjen and Mr. Paul Wheeler from Bartlesville; Mr. C. E. Paul, Mr. R. E. Bolles, and Mr. W. B. Showalter, of Muskogee; Mr. W. H. Coppedge and Mr. E. U. Opfell of Okmulgee; and Mr. Merle Engle and Mr. E. L. Southard of Sapulpa.

Mr. C. E. Gumm, of the Tulsa high school, opened the meeting with a talk on "Methods and Devices for Instruction in Electric Wiring." Mr. Gumm, in discussing methods of instruction, pointed out that in order to understand underlying principles, a textbook should be studied, with recitations, note-taking, and tests. The group method is followed, with a series of problems intended to help each pupil to understand electricity. A series of problems must be worked out, the purpose of which is to enable the pupil to come into contact with the elementary phases of the subject. Such topics as electromagnetism, and natural magnetism are studied first, by means of buzzers, bells, telegraph keys, and direct motors. Bell circuits which are next taken up, comprise some 22 different problems. In the work on batteries, an effort is made to teach pupils how to care for them in order to obtain the maximum use from them. The principles of induction are taught by means of transformers, motors, and induction coils. Ohm's law and a study of electricity in the circuit are topics taken up in the construction of toasters, grills, and soldering irons. The last part of the course in electricity takes up the radio, which includes some theory and a trip to the radio broadcasting station.

The second speaker was Mr. J. W. Bollinger, of the Roosevelt high school, Tulsa, who discussed the subject, "How Can Pupils Be Trained to Read and Understand Instruction Sheets?" He pointed out that instructors frequently complain that "pupils do not read," "they do not understand what they read," or "they can not follow directions which they do understand." He cited the instance of an instructor, who compelled his pupils to read job sheets, with poor results. He held that the problem should be restated to read, "How Can We Educate Pupils to Read and Understand Job Sheets?" He emphasized it is highly important that the instructor consider carefully what material should go into job sheets. Some well-known examples of job sheets now on the market were studied and the type selected as the best was that which enables the pupil to find what he wants quickly, easily, and clearly. He cited a typical experience: Upon asking a boy why he didn't consult the job sheet for an answer, the boy said: "Why should I read all that stuff when you can give me the answer immediately?" Answering the question how to get pupils to read and understand job sheets, it was urged that pupils be required to read the instruction sheet, one item at a time. While the instructor follows the procedure exactly as called for on the sheet, the pupils closely follow the demonstration as given by the

instructor. With the help of a series of partly completed problems and an exhibition of the successive steps in the making of a project, Mr. Bollinger firmly believes the problem of reading instruction sheets will be solved.

Supt. P. P. Claxton who addressed the club, declared himself in favor of manual arts work, emphasizing that more boys ought to be induced to take such work because there is a need for more shop workers, and fewer "white collar" men.

Dr. W. T. Bawden, who followed, showed an objective measuring scale for mechanical drawing, similar to the Thorndike handwriting scale. This scale, if generally adopted, he believes, would offer an accurate and reliable method for determining the quality of a pupil's work.—*J. W. Bollinger.*

VOCATIONAL GUIDANCE CONFERENCE

The Annual Conference of the National Vocational Guidance Association will be held in Dallas, Texas, February 24, 25, 26, 1927. The general topic for the meetings will be "Developments in Vocational Guidance since the World War." Dr. Iva L. Peters of Syracuse, the program chairman, has been largely responsible for the interesting program recently announced.

Among the speakers will be Dr. Carson Ryan, Swarthmore; Miss Mary Stewart, Washington; Mr. George Hutcherson, Albany; Mr. Herbert Clark, Los Angeles; Mr. Merle Prunty, Tulsa; Mr. C. E. Rose, Tucson; Mr. Howard Nudd, Miss Kate Dinsmore, Mr. C. Crampton, Dallas; Miss Florence Clark, Chicago; Miss May Rogers Lane, Cleveland; Miss Wilmer Shields, New Orleans; Dr. A. H. Edgerton, Madison; Dr. George Myers, University of Michigan; Miss Anna Pratt, Philadelphia; Dr. Harry Kitson, Dr. Mary Hayes, Dr. Helen T. Woolley, Dr. Goodwin B. Watson, Miss Emma Phinney, and Dr. Rollo G. Reynolds, New York City.

The topics to be discussed cover such questions as: Recent Developments in Educational and Vocational Guidance, the New York State Program for Vocational Guidance, The Federal Government and Vocational Guidance, Vocational Guidance in Southern California, The Vocational Guidance Program of the Tulsa Central High School, The Developments of Social Guidance since the World War, Social Guidance of Difficult Children, Measuring Character, Scholarships, Why the Y. W. C. A. Does Placement Work, Junior Placement, College Placement, and Special Problems of occupational research such as: A schedule and instructions for investigation, bibliography and reviews of occupational studies in pamphlet series, and training programs for educational and vocational counseling.

Although the formal opening of the conference takes place in Dallas, on Thursday, through the kindness of the New Orleans Vocational Guidance Association and Tulane University, an invitation has been extended to those interested in vocational guidance to stop over in New Orleans on Wednesday, February 23. As the Mardi Gras season shows New Orleans at its best, this is a rare opportunity. Those who intend to take advantage of it, should write to Miss Emma P. Cooley, Director of Vocational Guidance, Municipal Office Building, New Orleans, Louisiana. Requests about information regarding the program should be addressed to Miss Mary P. Corre, Denton Building, 7th and Race Sts., Cincinnati, O.

VOCATIONAL EDUCATION SOCIETY OF BOSTON

An exceptionally rich program was offered to the members of the Boston Vocational Education Society at the luncheon meeting held Saturday, December 11th, at the Hotel Westminster. Each of the speakers aroused an interest which might well have carried the afternoon's program unaided.

Mr. A. G. Wilson, of Clemson Bros., Inc., had as his subject, "Economy Effected in Metal Cutting." President Baker in introducing the speaker referred to the common impression that the cutting-off of metal is "punishment" and nothing else. He predicted that Mr. Wilson would correct that impression, and would demonstrate that hand hacksawing demanded no more drudgery and quite as much skill as any branch of the metal-workers' trade. This prediction was abundantly fulfilled.

The speaker used effective teaching methods by employing demonstrations in place of a mere lecture. He stated that the two most misused tools in the average machine shop are the twist drill and the hacksaw. The proper use of tools is even more important to an executive, he said, than to a teacher; since to the former, economy of production is a vital item, while to the teacher it is only incidental.

After sketching briefly the rudiments of hacksaw use—the direction in which the teeth should point, and the relation of the saw steel to the material to be cut—Mr. Wilson exhibited a section of a rail such as is used on street car lines, made with a high carbon content. He told of a complaint which had been made that it took from twelve to seventeen blades to complete a single cut of such a rail. Mr. Wilson himself demonstrated to the complainant that a single blade would do the job and do it well; the difference being in the method of handling the saw, and in the speed of the stroke. An apparently slow stroke, he said, is really a time-saver instead of a time-waster, since efficiency is attained by keeping the blade sharp, and not stopping to change.

In respect to position in sawing, Mr. Wilson quoted an old superintendent who insisted that the chief motion should come from the hips. The superintendent in instructing a green hand sometimes placed a chip on the man's shoulder, saying that with the proper motion the chip would not fall off.

The saw should be held freely, said Mr. Wilson, by both ends of the frame. The full length of the blade should be used. The motion should be similar to that employed in filing, in that the travel of the blade should be flat, not tilting at the ends of the stroke.

As to speed, the tendency of the average man is to take too fast a stroke. The speed bears a definite relation to the character of the material to be cut, and to the size of the teeth. The speaker demonstrated the use of the saw on a number of materials, including a cold chisel. In general, the harder the metal to be cut, the slower the stroke should be to avoid overheating, which ruins the blade. A fine-toothed blade, other things being equal, can be employed with a faster stroke without overheating; but its progress through the metal is proportionately slower. On soft metals a coarse blade can be effectively used. Mr. Wilson demonstrated an apparent exception to the rule in cutting a piece of brass tubing. Owing to the fact that the blade meets the two walls of the tube during each stroke, a fine blade should be used to reduce the friction.

In the cutting of iron pipe the position of the pipe is of importance. There is a "hump" on the inner side of the tube at the weld which is of hard metal. If this is at the bottom of the pipe, the blade will strike it broadside, and is likely to slip and be dulled. If, in placing the pipe in the vise, the seam is put at the side, the saw will strike it on the edge instead of at full width, and will cut through it more effectively.

The cutting of brass and bronze requires a keen, sharp blade, said Mr. Wilson. Composite materials, such as underground electric cable, present a special problem. The speaker exhibited a section of such a cable, nearly three inches in diameter, containing small copper wires, fibre, lead, and other materials. He told of being challenged once to cut through a piece of it in four minutes. He accepted the challenge. On this job he used a coarse blade and his actual time was one minute and a half.

With blackboard sketches Mr. Wilson showed the set and the pitch of saw blades. He illustrated graphically the pitch used by the company which he represents, and explained its advantages. For school use in hand frames, he stated, the eight and ten-inch sizes are sufficient, and no longer blade should be used. An 18-pitch blade is the best for all-around use.

The demonstration was brought to a conclusion by sawing into the neck of a glass bottle, using a hard blade, a lubricant of turpentine and camphor, and a slow speed of almost three seconds to the stroke. He offered to answer any questions which the members desired to ask, and exhibited samples of Star blades and pamphlets describing the product.

Mr. Edwin R. King, who recently terminated his active membership, and was elected an honorary life member of the Society, was the second speaker. Mr. King retired last June after thirty-two years as Supervisor of Manual Training in the New Bedford schools. His service is thus almost co-temporaneous with the manual training movement in the state.

Mr. King recalled the organization of the Society thirty years ago, under the name "Boston Manual Training Club."

He gave a brief sketch of the history of manual training in Boston and vicinity; a sketch based on personal recollection and participation, and enlivened with interesting reminiscences. He mentioned the introduction of shop work at the Institute of Technology in 1876. A graduate of that institution about 1878 started manual training courses in the North Bennett Street Industrial School, a private enterprise sponsored by Mrs. Q. A. Shaw, which down to recent times has made notable contributions to the progress of manual and vocational education. The work there having proved its success, Mrs. Shaw became interested in the training of teachers to supply the demand which began to come from the public schools for this type of education. It was Mrs. Shaw who got Mr. Larsson to head the Sloyd Training School, which for years trained nearly all the teachers of manual subjects in Massachusetts. Upon Mr. Larsson's death a few years ago, the school was taken over by the city of Boston, and is still conducted under the name of the Training School for Teachers of Mechanic Arts.

Mr. King was the first trade-trained man to be admitted as a student to the Sloyd Training School. In outlining the difficulties facing him in those days when the method of becoming a teacher was through colleges and normal schools only, he contrasted with that attitude, the present eagerness of school systems to get men from the trades and to furnish convenient opportunities of training for them.

It was in 1893 that Mr. King met Mr. Larsson and entered upon the career of teaching toward which he was directing his efforts after years spent in the woodworking trade. His first teaching experience, except for evening drawing classes in Boston, was in Medford. From there he went to New Bedford, where he organized the manual training program and carried it out to the present school year. During

that time the New Bedford Textile School—drawing pupils from all over the world—and the New Bedford Vocational School had their beginnings and grew into prosperous institutions. Both are pioneers in their respective fields; both are in a sense outgrowths of the movements with which Mr. King has been so intimately connected.

The speaker closed with two bits of advice; one personal, the other professional. He urged that everyone adopt a hobby, if for no other reason than as a provision against the age of retirement when one's occupational activity comes to a close. His own hobby is the reproduction of antique models in furniture. He has turned out to date, 460 pieces, each of them bearing his name and a serial registry number.

Preceding the speaking part of the program, a business meeting was held. Seven candidates were voted into active membership, as follows:

Charles W. Stahl, Boston Continuation School; Harold L. Price, Waltham High School; Nels H. Sandberg, Quincy Junior High School; John O. Baker, Parkman School, South Boston; Frank J. O'Rourke, Quincy Industrial School; Philip J. Spang, Quincy Industrial School; George H. Hey, Boston Trade School.

The secretary reported the rolls contain the names of 265 active members and 40 associate members.

President Baker announced a double trip for December 29th to the plant of the Mystic Iron Works at Everett, and to the factory of Lever Brothers in Cambridge. The next meeting was the annual get-together, held the evening of January 8th.

THE MARYLAND VOCATIONAL MEETING

The Maryland Vocational Association held its annual meeting on November 26th, at the Gwynns Falls Junior High School, Baltimore, in conjunction with the 59th annual meeting of the State Teachers' Association.

The general program was attended by 200 teachers and interested persons. Mr. J. D. Blackwell, state director of vocational education, acted as chairman of the meeting. Dr. Charles A. Prosser, of Minneapolis, was the principal speaker. Other persons who addressed the meeting were Dr. Raymond A. Pearson, of the University of Maryland, Dr. E. F. Buchner, of the College for Teachers, Hopkins University, and Mr. Samuel M. North, president of the Maryland Teachers' Association.

The sectional meetings were well attended and the splendid programs were a credit to the various sections. Among the speakers were Dr. W. Carson Ryan, president of the National Vocational Guidance Association, and Dr. Charles A. Prosser, of Dunwoody Institute.

At the business session, the following officers were elected:

President, Mr. Charles W. Sylvester, Baltimore; Vice-President, Mr. H. F. Cotterman, College Park; Secretary-Treasurer, Miss Elizabeth Shantz, Baltimore.

C. W. Sylvester.

PATERSON MANUAL TRAINING TEACHERS MEET

The manual training teachers of Paterson, New Jersey, held their regular monthly meeting in December, at School No. 6, Paterson. An interesting program was carried out under the direction of Mr. Fred Thompson.

Mr. Stanley Griffith, printing instructor at School No. 10, gave a brief account of the method employed in conducting a class lesson in printing. Mr. Griffith said he believes in the use of job sheets, but prefers to make these sheets himself in order to meet the peculiar conditions which prevail in the shop.

Following Mr. Griffith, the chairman called upon five boys to demonstrate the method used by Mr. Max Steiker, of School No. 6, in correlating shop work with other subjects of the school curriculum. The program carried out by the boys was as follows: The manufacture of lumber; concrete; furniture; what to teach in manual training. Mr. E. T. Whitford, principal of School No. 6, followed with a talk on "Manual Training from the Principal's Viewpoint."

Mr. Whitford urged the arrangement of work or working materials so as to save unnecessary moving and advance the cause of industrial efficiency. He said it would not be possible to have the high efficiency of the Ford organization, but it is essential to give more attention to economical distribution of materials and to the elimination of lost motion.

Commenting on the teaching of various methods of jointing, he urged that the development of the ability to choose properly between these methods so as to use the least possible time, without sacrificing efficiency in the particular job at hand, might well be motivated by time-saving ideals. He urged the use of proper tools to prevent marring of the project, attention to the need of a proper finish for a piece, and insistence on slower methods in some cases. The development of judgment in the balancing of values, he said, is very important. The teaching of economy might require some change in the practice of using mechanical tools, giving more attention to the care and handling of tools in the shop. Economy of energy ties up with economy of time, and the proper handling of tools requires less energy as well as less time. The proper choice of methods of work will, in the long run, save time as well as strength.

TRY-OUT COURSES ESTABLISHED IN CHATTANOOGA

Try-out courses in industrial education are offered for the first time this year at Chattanooga, Tenn., following a careful survey of the local industries. The city is an industrial community having 350 different manufacturing plants, and it was the opinion of Supt. J. S. Ziegler that more than ten per cent of the boys should be interested in industrial work.

At the beginning of the movement, Mr. O. C. Kirkman was appointed as director of the vocational work and as organizer and director of the new industrial arrangement. The school system was already organized on the six-three-three plan so that it readily adapted itself to the varied industrial program which was proposed.

As the initial step, twelve basic courses were outlined, each of which required six weeks' work, with the idea that pupils would in that time acquire the required degree of skill, that the work would hold their interest, and give to each the necessary occupational information, occupational experience, and counsel. The courses, with the exception of two, are basic trades in which men are employed by the thousand in the city's industrial plants.

In the first six weeks' period, it was decided to offer the underlying principles of mechanical drawing. The second six weeks' period is to be devoted to printing, followed by bench work and cabinet-making, with art fibre weaving thrown in as an interest factor. The fifth is carpentry, and the last of the group, electricity, is used to stimulate interest in the early spring months.

This year the work is built up around the seventh grade; next year the second group of courses consisting of concrete construction, plumbing, patternmaking, foundry practice, sheet metal work, machine shop practice, and agriculture will be taken up. The first group for the seventh grade will be repeated next year.

The teacher is permitted to use his discretion in transferring a pupil from the industrial to the academic work, where he becomes convinced that the pupil has not the natural ability for an industrial career.

Beginning with the third year of the junior high school, each boy who completes the twelve courses is permitted to select two of the twelve which appeal to him most. He is permitted to spend eighteen weeks on each of the two courses, which is the first place where trade skill is attempted.

In the senior high school is given the more advanced work for boys who have completed the junior high school course. The trade program for the high school calls for one to two years' work in day trade-school work in school, and one to two years' work on a part-time basis in the industry. The school training period and the shop period vary slightly according to the needs of the different occupations and each pupil who satisfactorily completes the work is given a certificate as a graduate.

During the present year, three trade courses have been organized, namely, auto mechanics, printing, and general woodwork. Additional courses will be added from year to year as the demand arises, until the work is well up to the standard for social and economic efficiency.

INDUSTRIAL EDUCATION IN UTAH SCHOOLS

The commission appointed to survey the schools of Utah (Bulletin No. 18, 1926) for the U. S. Bureau of Education, has reported both excellent and inferior work in non-vocational types of industrial education courses. In some of the rural high schools, excellent work has been accomplished in automobile mechanics, while in other rural schools, good work has been done in farm mechanics. The woodwork in both the rural and urban high schools is too much of the traditional type, emphasizing unduly wood turning and cabinet-making.

In one large urban high school, the work is organized with an exploratory objective in the junior high school and on the basis of the general shop plan. Activities are carried on in woodworking, wood finishing, sheet metal, and electricity, and the projects are well chosen, with reference to interest and abilities of the students.

There appears to be a need for efficient supervision that will bring the industrial work in junior high schools, both urban and rural, up to the standard of the best schools.

The commission recommended that courses in auto mechanics be made available in many more school centers, and that organized courses in farm mechanics be extended to all rural high schools. Woodwork courses in all types of high schools should be definitely related to the repair and maintenance jobs and the small construction jobs about the home and the farm.

There is a decided need for efficient supervision of industrial work in junior high schools, both urban and rural, and a need for a more careful statement of the specific objectives of industrial and manual arts courses. Research work should be undertaken in the industrial field to determine the needs for specific industrial training courses, and the desirability of introducing specific trade and technical courses in a large number of high schools, as well as the establishment of a state trade school. There is also a need for full-time special supervisors of industrial education in the interest of properly developed and coordinated courses in the larger city school systems.

THE TIME ALLOTMENT FOR MANUAL ARTS WORK

Mr. M. M. Proffitt, specialist in industrial education of the Bureau of Education, in a pamphlet on Time Allotment for Manual Arts Work (Ind. Ed. Bulletin No. 26, 1926), gives the result of his studies of the time allotment for manual arts work. For this purpose the Bureau collected data from 307 school systems with reference to the increase or decrease, during the ten-year period from 1915 to 1925.

In the tables, cities were listed as having increased their time allotment, even though some decrease was shown in one of the year-division groups, provided the gain in the other division indicated that it was more than sufficient to overcome the decrease noted. When this was not the case the city was listed as showing no increase. The no-increase list was then divided into three classes; one showing a positive decrease in time allotment, one in which there was no increase, and one for cities which had never had manual arts work.

Of the 307 reports received, 221 cities showed an increase in the time allotted to manual arts work, and 86 showed no increase. Of the 86 school systems reporting no increase in time allotment, several reported much larger enrollments in the courses offered, while many, ten years ago, were giving a fair amount of time to the subject. Two of the schools reported inability to make an estimate, one that the high school work was not under the administration of the city system, and one that there was a decrease in time allotted to the work due to large enrollments in vocational courses.

Table one, showing the distribution of representative cities with reference to increase of time allotment, reveals that 72 per cent of the cities had increased the time allotted. For cities from 5,000 to 10,000 population, 64 per cent had increased the time allotted to manual arts work; for cities from 10,000 to 20,000 population, 77 per cent; for cities from 20,000 to 50,000 population, 70 per cent; for cities 50,000 to 100,000, 82 per cent; and for cities from 100,000 upward, 75 per cent. The results indicate that the cities with 5,000 to 10,000 population still lag behind the larger cities in increasing the amount of time of the school program given to manual arts work.

Table two shows the increased time devoted to manual arts work in 221 cities in the first eight and last four years of school work. It shows that, of the 221 cities increasing the time given to manual arts, an increase was made in the first eight school years of 168 cities, in the last four school years in 165 cities, and in both the first eight and last four school years in 117 cities.

The data in table four shows that no city of more than 20,000 population is without manual arts; neither has any city in either the 50,000 or 100,000 group, or over 100,000 group decreased its time allotment for the manual arts. The greatest percentage of cities without manual arts is to be found in the 5,000 to 10,000 population group. Of this group, twelve per cent have no manual arts work, and 7.5 per cent have decreased their time allotment.

It was found that slightly more of the smaller cities increased their time allotment for the last four school years than did the larger cities, while slightly more of the larger cities increased the time allotment in the first eight school years than did the smaller cities. All cities with over 50,000 population reported a decrease in the time allotted to manual arts. Of the cities increasing the time allotment in the first eight and last four years, the greatest percentage, 64 per cent, is found in the 5,000 to 10,000 population group.

TRADE AND INDUSTRIAL EDUCATION IN MASSACHUSETTS

The annual report of the Massachusetts State Education Department for the year 1925 shows that there has been a very considerable increase in enrollment in the day trade and industrial schools. A few of the schools have reached the limit of their capacity and have been obliged to establish waiting lists pending additions to their buildings. This is true in the case of the Worcester Boys' Trade School where there is a waiting list of nearly three hundred.

While no new schools were organized during the year, new departments of automobile repairing have been established in the Holyoke Vocational School and the Quincy Industrial School. These new departments were opened with one teacher and sixteen boys. New departments of electrical wiring have been contemplated at the Chicopee Vocational School and the Somerville Vocational School. A new department of cabinet-making has been opened in the Westfield Boys' Trade School. Schools which were obliged to procure quarters outside the main building were the Holyoke, the Lowell, and the New Bedford vocational schools.

During the past year a very fine new building was completed for the use of the Dorchester Cooperative High School. The Quincy Industrial School is housed in a new building attached to but distinct from the high school building. The Lynn independent shoemaking school has been moved from its former location to a building formerly the English high school, which has been entirely remodeled and changed to suit the needs of the school. The Newton Vocational School has an addition which is devoted to the automobile repair department. The Brighton Cooperative High School has been given additional space for shop work which has proven most effective. The Lowell school has been obliged to use rooms and shops in other buildings to house the additional students. An addition to the Boston Trade School has been started which permits the expansion and development contemplated by the authorities. The addition will add fifty per cent to the floor space for growth and development of the new work.

The work of the evening industrial schools has shown steady growth through the year in number of students enrolled, number of teachers employed, and number of opportunities offered. Among the new courses offered are painting and graining, sheet metal drafting, marble setting, tile setting, paper hanging, electric wiring, steam engineering, plumbing for apprentices, and oxy-acetylene welding.

Developments of special interest were the new courses established under the auspices of the Commission on Apprenticeship for the building industry of Boston. Classes in tile setting, marble setting, and electrical wiring were organized at the Boston Trade School, and a class in electrical wiring at the Cambridge Evening Industrial School.

No new trade schools for women and girls have been established. A study of other lines of opportunity which might be developed at the Boston and Worcester Trade Schools has been made by the principals of the schools and the members of the faculties and advisory committees.

Several schools have established household mechanics courses in connection with continuation school work, thus providing a more diversified shop opportunity for boys. In Malden, continuation school boys have been assigned to industrial concerns for special vocational instruction on the part-time cooperative basis. During the year instruction was given in these schools to 25,795 minors and the net maintenance cost for the year showed a decrease of $2,242 over that of the last year.

The Status of State-Aided and Part-Time Schools in Massachusetts

The annual report of the Massachusetts Department of Education for the year ending November, 1925, shows that there were 176 schools of this type in operation during the year, these being located in 78 cities and towns of the state. There were seventeen day industrial schools for boys located in such cities as New Bedford, Newton, Worcester, Somerville, Lowell, Springfield, Westfield, Boston, Quincy, Holyoke, Lynn, Chicopee, Fall River, and Weymouth.

Industrial schools for girls were conducted in two schools in Boston and Worcester. One evening industrial school for women was established in the Trade School for Women and girls at Boston. Twenty-one day homemaking schools were conducted in New Bedford, Northampton, Newton, Lowell, Hawthorne, Quincy, Fall River, Somerville, Everett, Hadley, Weymouth, Pittsfield, Haverhill, Falmouth, and Amesbury.

A total of 37 evening practical art schools were conducted in New Bedford, Lawrence, Newton, Lowell, Worcester, Everett, Holyoke, Quincy, Somerville, Boston, Cambridge, Fall River, Haverhill, Brookline, Lynn, Chicopee, Chelsea, Norwood, and Medford.

There were 56 part-time cooperative and compulsory continuation schools in operation, in addition to thirteen vocational agricultural departments in day schools and five vocational departments in evening schools.

A JUNIOR HIGH SCHOOL PROGRAM FOR ART EDUCATION

An investigation of educational practice throughout the United States would reveal a general lack of uniformity among the courses of study offered in the junior high school art departments. The trend is toward a comprehensive and inclusive curriculum which attempts to organize, unify, and present the subject matter in such a way as to represent the field.

Mr. Leon L. Winslow, director of art in the Baltimore, Md., public schools, in the Baltimore Bulletin of Education, discusses the principles and aims of the new art course for junior high schools of the city. He writes:

"In the junior high schools the subject of art is required of all pupils. Instruction is organized around five major topics as follows: Architecture, sculpture, painting, industrial art, commercial art. About half of the pupil's time in the class is given to recitation, lecture and and textbook assignment, and the other half to practice in drawing and design. A general outline of the entire field, supplemented by more specific outlines dealing with architecture, sculpture, and painting, has been developed by the division of art education during the past year.

"The aims of the course as stated in the preliminary outline are: (1) To arouse and preserve in all pupils the interest in art through the cultivation of appreciation by setting up ideal standards of excellence and by developing artistic taste; (2) To enlarge and enrich the esthetic experience through the exercise of the creative impulse and imagination by practice in using the principles of design and through the development of skill in execution; (3) To furnish educational and vocational guidance in art through making allowance for individual differences, through differentiating appreciation, and through discovering talent; (4) To provide for the talented vocational training in art."

A survey of the junior high schools made last June for discovering aptitude in the arts disclosed 109 pupils with marked ability, of whom 68 were girls and 41 were boys. Of the total number of pupils, 29 were gifted in the painting line, 30 in the industrial art line, and 33 in commercial art.

NOW, ARE THERE ANY QUESTIONS?

Finish for Ship Models

Q. 695. Will you give a method of finishing ship models so that they will look aged? We are making some of the models which are used so much now for decorative purposes, but have been unable to produce an old finish.—W. L. K.

A.: Ship models may be antiqued by brushing on a starch coat as in polychroming or waxed and dusted. In the first, a tablespoonful of laundry starch is rubbed up in cold water, after which enough boiling hot water is added to make a thin, perfectly clear, and slightly blue-tinged solution. This is applied with any soft brush, and if it fails to adhere properly to the painted or varnished surfaces, a few drops of alcohol, lemon juice, or vinegar added to the starch solution will correct the trouble. When this cooked starch solution has dried, the work will appear flat or without gloss; it may then be dusted over with rottenstone. All excess should be removed with a soft, dry bristle brush, leaving only so much in the corners and inequalities as will give the desired effect. The second method calls for the application of ordinary floor wax, preferably the liquid type, with a fine bristle brush, allowing it to set and then dusting with powdered rottenstone as above. This is one of the reasons why good models, properly antiqued, bring high prices, due to the considerable labor involved on the rather delicate detail.—*R. G. Waring.*

Portable Bleachers

Q. 699. We are anxious to build portable bleachers. Can you give us any help on the construction?—S. R. B.

A.: The INDUSTRIAL ARTS MAGAZINE for August, 1916, contains full details of a demountable bleacher, which can be attached to the wall. The magazine for September, 1923, contains full illustrations and a description for a take-down bleacher, which can be built independent of the wall and the gymnasium.

Refinishing Golden Oak in Italian Oak

Q. 704. How may I remove golden oak varnish from a solid oak piece of furniture, and restain and finish it in Italian oak?

How may I cure or season a section of a walnut tree trunk to prevent checking and cracking?—R. C. S.

A.: In refinishing golden oak to make Italian oak, strip off the old varnish with varnish remover, using steel wool No. 3 to pick out the filler from the pores during the process; wipe clean with old pieces of burlap, clean thoroughly with denatured alcohol, and let dry. Use a solution of Oakite or Tromite, one-half cup per gallon of boiling water, and a good scrubbing brush to remove all traces of grease remaining from the varnish remover, as well as to open up the pores of the wood. Let dry thoroughly and sand clean to a smooth, hard surface. Make up a solution of water soluble nigrosine, one ounce per gallon of boiling water, apply in a full, even coat with a brush and let dry. Even the tone of the work with a split 6-0 paper, dust off, and apply a filler made from powdered rottenstone, thinned with turpentine to a milk-like consistency, and carrying two tablespoonfuls of Japan drier per pint of filler. This should be allowed to set until free from gloss, thoroughly cleaned off across the grain with burlap, and wiped off with clean rags. Allow at least twenty-four hours in a warm room for the filler to dry. Apply one, two, or three coats of high grade brushing lacquer, allowing not less than three hours between coats and not the thirty minutes mentioned on the label. It is not necessary to sand between coats of lacquer, since successive coats dissolve each other sufficiently to offer perfect bonding. Let the last coat of lacquer dry twenty-four hours in a warm room, after which it may be rubbed dull with a felt pad, FF pumice stone, and crude oil, cleaning up with fresh rags. Some Italian oak finishes use a filler made of white lead, 75 per cent, and zinc oxide 25 per cent, thinned with turpentine and Japan drier base, wiped clean after application, dried twenty-four hours, and then lacquered as noted above. The rottenstone method, however, is the more desirable. High-lighting effects can be secured by partially sanding out the stain at such points as wear would naturally occur, or where the light would appear to cause a marked reflection. This is then followed by the filler coat.

The usual method of curing walnut is to hold it in the log pond until ready to saw, to prevent checking, after which it is cut up and stacked carefully under cover in the lumber yards, to season slowly until ready for kiln drying. The lumbermen and dry kiln operators in this section do not offer suggestions for the curing of a walnut tree trunk. I tried several methods two years ago on various sections of a walnut tree which I had cut, but was not able to prevent the formation of large cracks or checks.—*R. G. Waring.*

A COMMUNITY PROBLEM IN MANUAL ARTS

Mr. C. S. Nicholas, writing recently in the Michigan Vocational News-Bulletin, has described a community problem in manual arts which was carried out by the manual arts department at the Western State Normal College.

Where a school band or orchestra is in operation, says Mr. Nicholas, it is frequently found that one or another of the players fails to bring his music stand when he comes for rehearsal. The result has been a serious lack of stands to enable the players to seat themselves so that they may see the music comfortably. It was suggested that the manual arts department might make the stands, these to become the property of the school and to be used by all musical organizations in the school.

The first problem of the instructors was the matter of financing. While the school work is not run on a money basis on work of this kind, material must be obtained in addition to that regularly appropriated for the prescribed work. For this reason, the student council was induced to assume the task of raising the money. A committee was appointed to get estimates on the material, and these were submitted to the council and approved. When this had been completed, the attention was directed to the question of design. The stand was patterned after a professional music stand, but the lyre was worked out as a black "W", this letter being appropriate for the institution and adopted by the athletic department.

After the completion of the design and working drawings, the patterns were made, which in due time were ready for the foundry. As there were no facilities for melting the cast iron, the patterns were sent to a local foundry, where castings were made for 34 complete stands. Black iron pipe ⅜" by 26" was used for the shaft, and ⅜" cold rolled steel rods were used to support the lyre and make it possible for height adjustments. The working out of the castings for holding the lyre, with allowance for tilting, was the most accurate and complicated part of the machine work. The boys made the jigs for all duplicate parts so that they were interchangeable. This provided an excellent opportunity for adapting factory methods to school shop production. The miller, shaper, drill press, lathe and bench work were utilized in machining and assembling the parts.

In the making of the lyre, several different methods of building were attempted. Finally, it was decided to use 5-ply ⅜" birch panel stock (G2S). The panels were cut into pieces 14½" x 20½", put up in bundles of six, and after being traced from the pattern in the mechanical drawing department, they were sent to the jig saw to be cut. The smoothing out of the edges and preparing them for finishing provided an opportunity for using teamwork effectively.

The final job was the finishing of the stands in the school colors of brown and gold. An opaque finish was applied over the wood as well as on the metal. First the metal was filled with a metal filler and sanded down to produce a smooth surface on which to apply the color. For the brown, a flat paint was purchased and then matched to the desired color by the use of paint pigments. For the gold a Klondyke gold bronze powder was used, mixed with spar varnish. After the colors had been applied and sanded to a smooth surface, the whole stand was given one coat of spar varnish.

The problem offered a wide variety of operations, giving an excellent opportunity for using different shop units, and for effective teamwork among the students.

HANDLING THE COST OF MATERIALS IN SCHOOL SHOPS

Mr. Edward C. Emerson, of Boston, Mass., in a recent bulletin, describes a new policy for handling the cost of materials in elementary and junior high school shops. The new procedure has been put in operation only in the case of the larger and more important projects, because it was feared it might work a hardship on some pupils who could not afford to pay, and because it was feared the procedure might result in a loss of interest and initiative on the part of some pupils.

Under the arrangement, all completed projects are the property of the Boston school committee and may be retained by the committee for any purpose. Projects made by individual students, if not desired by the school committee for any purpose, may be purchased by the pupil at the cost of the material used in their construction.

All projects which do not meet the required standard must be destroyed. Projects which meet the required standard and which are not purchased by the pupil making them, are reported to the associate director of manual arts in June each year for such disposition as may be desired.

In one city in Massachusetts, where the plan is in operation, it is found that all pupils readily pay for what they desire, and the fact that the pupil is made to realize that there is a real money value in from it. This city is reimbursed each year to the amount of sixty the work, has stimulated interest and initiative rather than detracting per cent of the cost of the material.

These two Stanley Try Squares

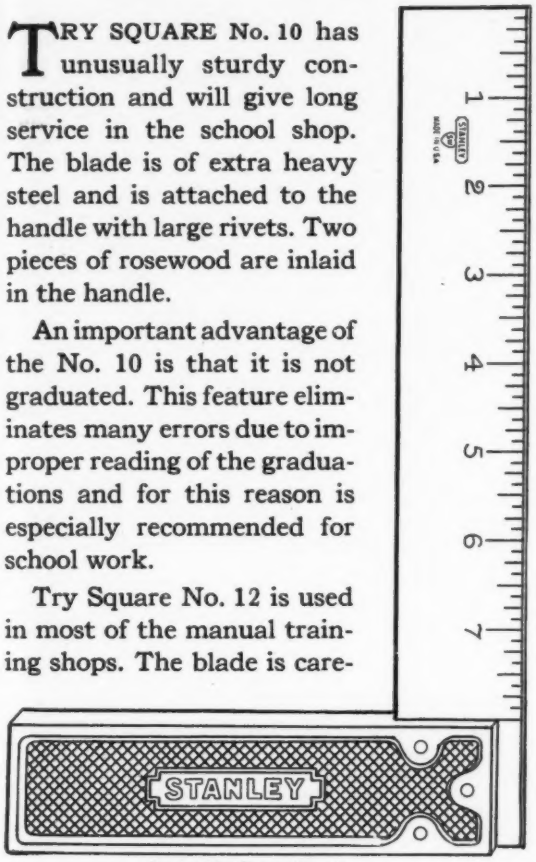
are recommended especially

for Manual Arts Classes

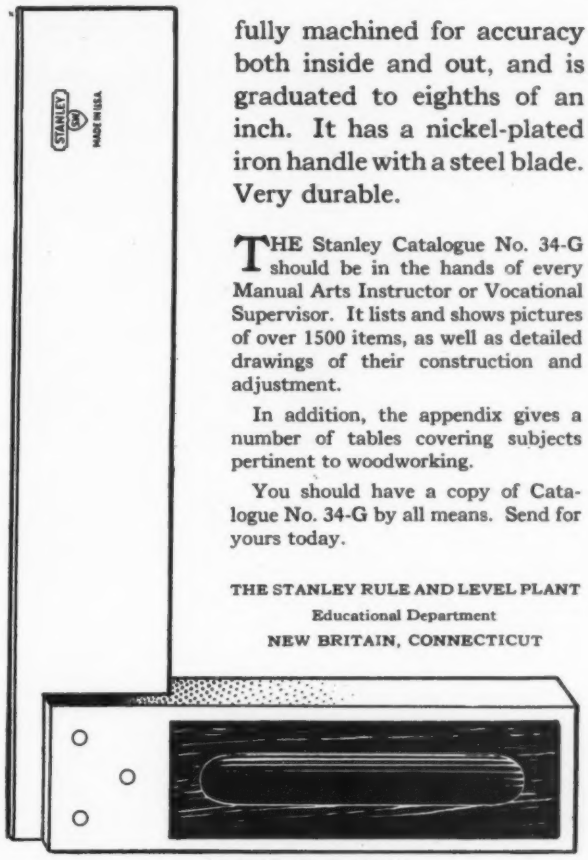
TRY SQUARE No. 10 has unusually sturdy construction and will give long service in the school shop. The blade is of extra heavy steel and is attached to the handle with large rivets. Two pieces of rosewood are inlaid in the handle.

An important advantage of the No. 10 is that it is not graduated. This feature eliminates many errors due to improper reading of the graduations and for this reason is especially recommended for school work.

Try Square No. 12 is used in most of the manual training shops. The blade is carefully machined for accuracy both inside and out, and is graduated to eighths of an inch. It has a nickel-plated iron handle with a steel blade. Very durable.



Stanley Try Square No. 12



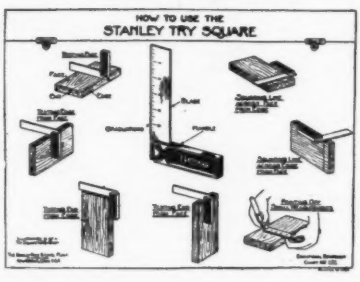
Stanley Try Square No. 10

THE Stanley Catalogue No. 34-G should be in the hands of every Manual Arts Instructor or Vocational Supervisor. It lists and shows pictures of over 1500 items, as well as detailed drawings of their construction and adjustment.

In addition, the appendix gives a number of tables covering subjects pertinent to woodworking.

You should have a copy of Catalogue No. 34-G by all means. Send for yours today.

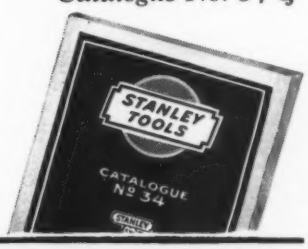
THE STANLEY RULE AND LEVEL PLANT
Educational Department
NEW BRITAIN, CONNECTICUT



THIS CHART WAS MADE TO HELP THE BUSY INSTRUCTOR

Use of the chart at the left will save time and aid materially in instructing pupils in the use of the tool. This chart and others on the plane, chisel, hammer, common joints, etc., are free for classroom display. Send for them today if you have not been supplied.

Send for Catalogue No. 34-G



STANLEY TOOLS

STANLEY EQUIPMENT IS STANDARD EQUIPMENT

Good Schools deserve "YANKEE" TOOLS

A finger touch on Ratchet Shifter gives any one of five adjustments.

The "YANKEE" Ratchet is a Short Cut to Results

With "Yankee" Ratchet Breast Drill No. 1555 set on DOUBLE Ratchet, any slight movement of the crank, either back or forth, lets you drill continuously.

Think of what this means when you have space for just a half turn—or only an inch.

Nothing need be removed. No lost motion. No lost time.

The four other ratchet adjustments shown above, and two speeds, make this "Yankee" Drill the handiest and fastest ever designed.

You can change speeds instantly without removing drill from work. Just shift lever at base of hub.

Ratchet Breast Drill No. 1555 (Illustrated), 3-jaw; No. 555, 2-jaw. Hold ½ in. Drills. Ratchet Hand Drill No. 1545, 3-jaw; No. 545, 2-jaw. Hold ⅜ in.

For smaller drilling jobs use "Yankee" Ratchet Hand Drill No. 1530, with five ratchet adjustments.

Some other "YANKEE" TOOLS

Plain Screw-drivers
Ratchet Screw-drivers
Ratchet Bit Braces
Automatic Push Drills
Automatic Feed Bench Drills
Vises, Removable Base

FREE

New "Yankee" Tool Book

This interesting little book is for all lovers of fine tools. It tells just what you want to know about all the famous "Yankee" Tools. Write for your copy today.

Dealers Everywhere Sell "YANKEE" Tools

"Yankee" on the tool you buy, means the utmost in quality, efficiency and durability.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

NEWS NOTES

Function of Industrial Arts. Mr. Elmer W. Christy, director of industrial arts at Cincinnati, O., speaking before the presidents' meeting on December 3rd, declared that the modern school occupies an increasingly important place in the lives of boys today because educators have changed their point of view. He pointed out that, instead of gathering pupils together in unnatural groups and dictating formal, uninteresting drill, we now endeavor to determine what are the essentials of education and to relate them to their interests as boys. The industrial arts constitute one of those factors in the general program designed to vitalize school work with opportunity for various choices to meet individual interests. He emphasized that tools and the material with which to work are essential factors in the program of developmental experiences. The tools used mark the position that human beings occupy in the march of civilization through the ages.

Cooperative Work in a New York High School. Cooperative work in the Roosevelt High School, New York City, was started in September, 1926, with a group of students above the fourth term.

The course meets the needs of several types of pupils but is especially valuable for pupils who require financial assistance. At least sixty per cent of the pupils taking the course claim they would be obliged to leave school were this assistance not provided. Several have voluntarily taken the course because they desire to work and do not care to withdraw from school. Again, some students believe it is to their advantage to obtain business experience in this way and be able to go out after graduation as experienced workers.

The cooperative idea has been well "sold" to the industry. The work is being well and intelligently organized by some of the best and most progressive firms in the city. The Roosevelt high school students are placed with such firms as the R. H. Macy Company, the Remington Typewriter Company, the Madison Mills, James A. Hearn, Sargent Hardware Company, and the Encyclopedia Britannica. There is a great variety of work with salaries ranging from twelve to sixteen dollars a week.

The present principal of the school is a man who has been identified with cooperative work from the beginning and is in entire sympathy with it. Mr. Hayward has brought to the problem an experience that is most helpful.

Vocational Exhibit. During the week of November 15th, the city schools of Portland, Ore., conducted a successful and instructive exhibit of their vocational activities. Beside a display of projects from the regular day school, there was a booth for paper hanging, painting, and garment making.

Steam Engineering Class. A class in steam engineering has been conducted at the Salem, Ore., high school, under the direction of Mr. R. B. Boals. The class is composed of men actually employed in the trade.

Addition to Technical High School. The Boys' Technical High School, Milwaukee, Wis., has become very much overcrowded and a request has been made for the immediate erection of an auditorium and for the opening of additional classrooms.

Progress in Apprenticeship Training. According to the annual report of the Federal Board of Vocational Education, material progress has been made during the last three years in the establishment of various types of programs for apprenticeship training in many of the skilled trades. The development has taken place more or less generally throughout the country. Formerly both employers and employees recognized definite periods of apprenticeship in the skilled trades. In recent years it has been found that employers do not hire apprentices and young men are not entering upon apprenticeships preparatory to becoming tradesmen, but take training for semi-professional or professional positions, or secure jobs as specialized operatives at much higher wages.

In recognition of the need for trained workers in the skilled trades, joint committees were established in different trades and in various localities to draw up plans of apprenticeship training. As apprentice education has developed within the past few years in many localities, under the guidance of special joint committees, it has been demonstrated that young people of the present day and generation will enter apprenticeship to learn a skilled trade. The actual accomplishments recorded in a number of cities in various trades in re-establishing a system of apprenticeship under modern conditions has led to attempts in several states to secure the enactment of a state apprenticeship law similar to the one which is in successful operation in the state of Wisconsin. Without the aid of a state law, Pennsylvania has organized a state apprenticeship committee to promote apprenticeship in the plumbing trade.

Interest in apprenticeship education has been especially noteworthy in the case of the building trades. Among the states which have organized definite training for building trades apprentices under public auspices, in cooperation with employers and employees, may be mentioned Ohio, Missouri, Michigan, Illinois, Oregon, California, Washington, Pennsylvania, Iowa, Maine, Massachusetts, Connecticut, Rhode Island, New Jersey, New York, Tennessee, and Florida. Among the building trades for which apprentice training was given under public auspices may be mentioned painting and decorating, bricklaying,

(Continued on Page 28a)

The Material for Future "Greats"

EVERY boy with the proper inclination and training represents a "future great" in the making. Equip your boys with the best materials that they may become master craftsmen. Let them work with Algoma, "the better plywood"—it is unequalled for cabinet making and for general use in the woodworking shop.

The quality is Algoma controlled. From the cutting of timber in Algoma forests to the last careful seasoning in the Algoma process—in every way Algoma Panels measure up to the highest standards of exactitude, precision, and excellence.

Become acquainted with Algoma service. Let us supply you direct from our stock warehouse in Chicago at wholesale prices. Large assortments of woods and sizes are always ready for immediate shipment. We stock panels for cedar chests — write for particulars. Our monthly price list will keep you in touch with the markets — just ask us to send it to you regularly.

Feel free to consult the experts in our Service Bureau. They will gladly give any special advice in connection with the use of hardwood.

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The Better PLYWOOD

What is the "Web" of a twist drill?

And the "Heel" — the "Lips" — the "Body" — and just where is the "Point"? Do you know just what "Lip Clearance" means?

The "HANDBOOK FOR DRILLERS" answers every question the student of modern drilling practice must know. It tells him not only the "How" but—what is more important the "Why" of the different parts of the twist drill.

Because this booklet is both theoretical and intensely practical, it is being used by hundreds of Vocational, Technical and High Schools throughout the world as the standard textbook on drilling practice.

The "HANDBOOK" is issued by this Company, not to promote the sale of its products, but to educate prospective, and not a few **experienced,** drill users to a better and more intelligent understanding of the twist drill and its use.

Instructors are cordially invited to ask for copies of the "HANDBOOK FOR DRILLERS" in any reasonable quantities, free of charge, for the use of their students.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

(Continued from Page 26a)

plastering, carpentry, plumbing, metal lathing, tile setting, sheet metal work, electrical work, and paper hanging. A similar growth has been noted in the establishment of apprentice programs in the railroad trades, such as car repairing, machine shop and boiler making, and the operation of locomotives. Apprentice classes of this type have been established in the states of Illinois, Iowa, Nebraska, Oregon, New Mexico, California, Oklahoma, North Carolina, Mississippi, and Texas. During the past three years public programs of training apprentices have been developed in many other lines of trade work. Among these may be mentioned the foundry trades in Wisconsin, Illinois, and Iowa; the silversmith work in Connecticut; jewelry manufacturing in Rhode Island; pottery work in New York and Ohio; granite cutting in New York; printing and bookbinding in Tennessee; shipbuilding in Virginia; baking, pattern making, and stage carpentry in Illinois.

The Operation of Plant Programs for Employees. The Federal Board for Vocational Education, in its latest annual report of the progress of vocational education, shows that programs for training employees have been maintained in many plants and industrial organizations, particularly in types of work involving a high degree of skill. In recent years there has been a noteworthy development of training programs in the case of industries employing special operatives on work classed as semi-skilled labor. In some cases, the classes have been established, supervised, and aided from public funds, although conducted directly in the plant. In other cases the plants have preferred to operate their own programs and to finance them themselves, only asking for advisory assistance from the state department of vocational education.

The establishment of facilities for training girls and women has been coincident with a greater freedom of choice in the occupational field, opening to women better paid and more congenial lines of work. With the increase in the number of women employed and the increase in the use of automatic machines, there have come opportunities for employment in inspectorial, supervisory, and managerial jobs which have brought a new point of view, a new opportunity for promotion, and a definite value to a training program.

Some plants have established vestibule training, initial to employment, to give a mastery of the processes of work jobs, while other industries have provided for an unorganized apprenticeship during the period of employment to give a mastery of the early stages of progression with further provision for training forewomen and prospective forewomen.

Many of the women-employing industries have established and maintained at their own cost successful schemes of instruction which have passed the experimental stage for operative, supervisory, and directive positions. In some instances, advisory service and direct assistance in training plant instructors have been rendered in this connection to industrial plants by industrial education agents of the state vocational boards.

The realization of the need and value of training has led to the employment of trained and experienced women as directors of training and personnel in plants in which women workers predominate.

Another special development in the matter of plant-training programs in cooperation with the vocational education authorities in the various states has been in the matter of part-time general continuation schools and classes. Organized plant training has been attempted in such states as Michigan, New York, and Pennsylvania.

A third type of plant training in which there has been a definite participation and contribution by the state boards for vocational education is exemplified in a number of the southern states. In South Carolina the Abbeyville textile mill maintains a special school for its employees, who attend classes one hour each day during the regular working day. In the case of junior workers, the mill employs extra hands in each department to relieve the regular workers who attend classes. The adult workers attend whenever they are able to get away from their work for a brief time.

In Louisiana, the New Orleans Public Service Company, as a result of foremanship service, has established a comprehensive program of plant training and employed an educational director to place it in effect. Not only has the director continued the program of training, but a number of intensive classes for workmen in the various departments have been organized and conducted.

In North Carolina the state board organized evening classes for workers in upholstery at the Tomlinson upholstery plant. The success of these classes resulted in the organization of a training program for all departments of the plant. As a result, the plant has been able to train its own workers and is no longer dependent upon hiring trained workers, but takes on green help and develops them into trained workers.

Special Service to Specific Industries. The Federal Board for Vocational Education, in its latest annual report, shows that during the past few years there has been an increasing range of activities on the part of the state boards for vocational education with reference to rendering special services to industries within their states. Several years ago, assistance was given in offering instruction specially

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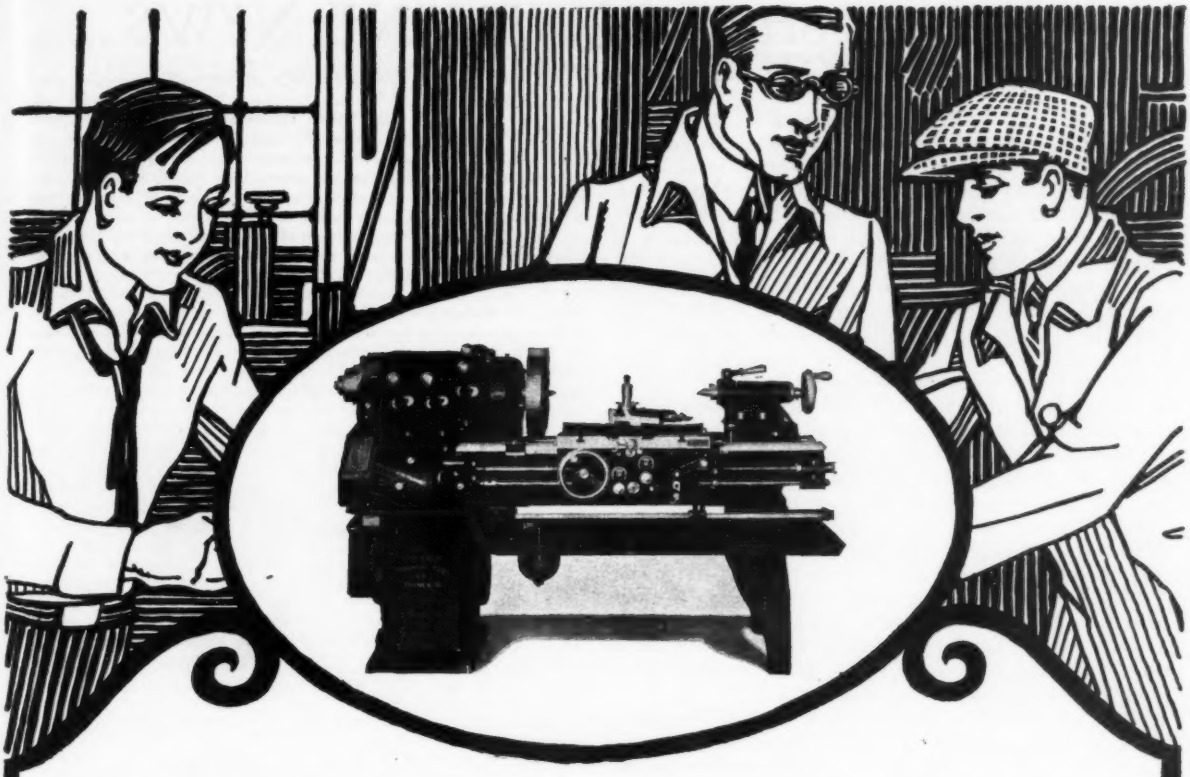

Train Your Students for their Jobs — Use MONARCH LATHES

Train your students on MONARCH LATHES and when they go from your school they will be ready for their jobs —valuable men immediately without the necessity of going through another period of training in the shop.

The student that is trained on a Monarch Lathe is trained in actual shop practice — for the Monarch is the first choice of Industrial America. Today more Monarch Lathes are being sold to industrial plants than any other lathe built.

The Monarch motor-driven, helical geared Lathe is the ideal equipment for instructional purposes. It is far in advance of other lathes in design. It is as near danger-proof as any lathe can be made. It is as noiseless as any lathe can be—an important advantage in the instruction room.

Monarch Lathes are used in the Massachusetts Institute of Technology, Yale, Cornell, and in hundreds of the best technical and high schools — proof that the Monarch is the practical lathe for modern school equipment.

The success of your school and the success of your students are inseparably linked together. Use MONARCH LATHES and meet the modern demand for training that *fits men for their jobs.*

Illustration above shows 14 x 6 helical geared Monarch Lathe

THE MONARCH MACHINE TOOL CO.

100 OAK STREET - - - - - - - SIDNEY, OHIO

SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desire to keep abreast with news of new Machinery, Tools, Supplies, etc.

THE TURRET LATHE AS USED IN INDUSTRY

In Small Lot Production and Its Influence in the School Shop

The pamphlet entitled "Net Profits from Small Lots," published by the Warner-Swasey Co., of Cleveland, Ohio, should be of interest to all instructors of Industrial Arts, because it gives valuable information on machine methods as used in industry today.

Methods of doing operations in industry are continually changing in order to produce a better article, and at a lesser cost. For example, the engine lathe played a major part in 11 turning operations in a machine shop just a few years ago. Today the turret lathe is rapidly taking its place alongside the engine lathe, because it is found profitable to set up a turret lathe for a small number of pieces.

Instructors of industrial arts must keep pace with industry. In the large school shops where machinery is to be installed, the most modern and best machines should be chosen, first, because the boys should have training on machines such as are used in industry, and second, because they require less up-keep, and hence are the cheapest at the end.

The instructors of small school shops where the equipment is limited, and where costly machines can not be installed at present can supplement the instruction by talks to the class, setting forth how industry today is doing things, possibly using the pamphlet as an outline.

The teachers who practice guidance work in their classes can also obtain some valuable information to present to their classes. The difference between a set-up man and the operator of a turret lathe, what the responsibilities are of a set-up man, what he should know, etc., are points that all boys working in a school machine shop should know. These are some of the interesting facts that can be developed for class information; moreover, the linking together of school and shop practice is indeed desirable.

DEVELOPMENT OF INDUSTRIAL STANDARDIZATION

The American Engineering Standards Committee, New York City, has reported notable developments in industrial standardization, including important progress in the mechanical and mining industries, in industrial safety, and the extension of managerial and trade association activities during the year 1926. It appears that the systematic organization of standardization work is leading to a much larger degree of cooperation between companies. As a result of such work, for example, more than thirty Cleveland firms have reorganized their screw thread practice in accordance with revised national standards, and more than a dozen firms have systematized their entire control of interchangeable manufacture through the introduction of a new standard of limit gaging.

In the matter of government activities, it is reported about fifty simplifications have been carried through, including a wide range of commodities from bed springs to gun shells, and from milk bottles to range boilers. In a survey of nineteen commodities, it is shown that from 51 per cent to 99 per cent of the sales are in accordance with the simplified practice recommendations, the average of the nineteen being 79 per cent.

In the matter of mechanical standards, the work of the committee on tooth form of spur gears has been completed and submitted for final approval as a tentative American standard. Work has been completed on such items as bolt, nut, and rivet proportions, pipe flanges and fittings, and high pressure steel flanges. Plans are under way for the organization of an advisory committee to keep the various parts of the work properly coordinated.

Twenty of the fifty codes of the national safety code program have been approved, among them a group of codes for the prevention of dust explosions, and new editions of codes for abrasive wheels and punch presses.

An important development has been the revision of the national electrical code, which is a guide for wiring devices. Arrangements have been made for a revision of the standard plan of reporting and compiling accident statistics. This plan forms the basis for the accident statistics of the various state governments and for the casualty insurance companies.

BUYERS' NEWS

The Evolution of a Saw. A hand saw is a tool which is constantly in use in the school or commercial shop. In order to give the best service and to insure its use over a long period of time, a saw must be made of the best steel, in the most approved manner, with due attention to construction and finish.

In maintaining the usefulness of a saw and proving the value which the manufacturers have put into its construction, it is essential that the saw receive the proper care and filing.

A Disston hand saw, purchased in 1899, by Mr. William L. Mann, of Wilmington, Calif., is still in use as a result of the care it has received. The saw was used for 27 years, and during this time its width has diminished through many sharpenings, although the temper remains the same. The spring and life of the blade still respond to the touch and the edge still cuts straight to the line.

A DISSTON HAND SAW AFTER 27 YEARS OF SERVICE.

From a shining, new 26" saw, the Disston saw has continued in service for 27 years, until it now resembles a keyhole saw only 7¾" in length.

The illustration shows Mr. Mann's saw as it appears today after 27 years of service.

PUBLICATIONS RECEIVED

American Art Aid for Grade Teachers. American Crayon Co., Sandusky, O. The pamphlet contains a variety of new art ideas for the winter months for grades one to eight. The problems are suited to the month in which they appear and are adapted to the ages of the pupils. The illustrations are clear and sharp and up to the standard in artistic quality.

New Sheet Metal Publication. Teachers of sheet metal work and of architectural drawing will be interested in a new publication of the Sheet Steel Trade Extension Committee, 715 Oliver Building, Pittsburgh, Pa. The title of this new publication is "Sheet Steel Cornices." The content includes the standard specifications for fabricating and setting building cornices.

Home Economics Equipment. Three series of lantern slides, depicting good home economics equipment for teaching the subject in colored schools have been recently issued by the United States Department of Agriculture. The series shows equipment used in teaching textiles and clothing, foods and nutrition, and housekeeping and home making.

New Lantern Slide Series. Two new series of lantern slides on the control of household pests have been issued by the United States Department of Agriculture. The pictures show pests destructive to property, and those destructive to health, and are available for distribution through the office of the department of agriculture, Washington, D. C.

NEWS AND NOTES

Evening Industrial Classes. The aim of the evening industrial school of Quincy, Mass., is to provide such instruction for men in the industries as will help them to higher efficiency in their vocations.

During the past season, classes have been maintained in machine shop practice, sheet metal, drafting, electrical wiring, plumbing, and roof-framing.

The total registration was 148 men, distributed as follows: Machine shop practice, 25; sheet metal drafting, 25; electrical wiring, 33; plumbing, 39; roof-framing, 26.

Increase in Agricultural Students. There was an increase of thirty per cent in the enrollment of students in vocational agriculture courses in the state of Virginia last year. There were 112 high school departments, 85 evening classes for adult farmers, and 20 classes for boys who left school during the current year. This type of work has developed into a wonderful Problem-Project program of instruction. There were conducted 441 vocational classes with a total enrollment of 12,000 students.

The Brewster Vocational School at Tampa, Fla., has an enrollment of 550 in day classes and 1,200 in the evening classes. The equipment is equal to that of any similar school in the southern states.

(Continued from Page 28a)

designed for the industry of coal mining in the states of Pennsylvania, West Virginia, Ohio, Kentucky, Illinois, Colorado, Kansas, Alabama, Iowa, Maryland, New Mexico, Oklahoma, and Wyoming. This work has been continued and developed not only in these states but in others having the same problem.

The sugar refineries have received similar assistance in the states of Colorado and Utah. A number of southern states have made a study of opportunities for service, and foremanship educational programs have developed in connection with the textile industry. This has been true in Virginia, North Carolina, South Carolina, Georgia, Alabama, Tennessee, and Arkansas. In some cases, specific service has been rendered to special industries in such states as New York, Massachusetts, Pennsylvania, Michigan, and Wisconsin in which compulsory part-time attendance laws are in effect.

The supervisors of industrial education in the states of Iowa, Minnesota, Nebraska, Tennessee, and Texas, have made special training available to assist hospitals in training nurses.

The lead and zinc mining field in Kansas, Missouri, and Oklahoma has received assistance through a joint program of the three states in the provision of foremanship courses. This service will be extended to the establishment of evening schools or classes at important centers in the mining fields in connection with the industry.

The lumber industry has received assistance in connection with kiln-drying courses carried out by the states of Arkansas, Mississippi, Tennessee, and Wisconsin. This service was rendered in response to a demand on the part of the industry for assistance in connection with kiln-drying. In cooperation with the U. S. Forest Products Laboratory, the state of Arkansas conducted classes in two centers at lumber plants to which representatives from the lumber and furniture companies were sent.

An example of the service rendered to an individual industry by a state vocational board may be noted in the apprentice training school for marble setters maintained by the state of Tennessee in cooperation with the National Association of Marble Dealers. A fourteen-week course, with a fifty-hour per week program, in marble cutting and setting, drafting, estimating, blue print reading, and business methods is conducted periodically. Under an agreement, apprentice marble setters are given six months' credit on their apprenticeship time by the national labor organization of marble setters. Up to the present time five such fourteen-week courses have been conducted with a total enrollment of 53 apprentices, representing fifteen states as follows: Tennessee, Alabama, California, Delaware, Georgia, Illinois, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, Ohio, Oklahoma, Rhode Island, and Texas. The records show that 49 out of the 53 boys attending the course, or 92.4 per cent, have since gone to work in the trade.

Ohio has assisted the ceramic industry in establishing cooperative courses of secondary grade for pottery workers in the state.

Rhode Island has established courses for apprentices in jewelry manufacture.

In Pennsylvania, two instructor training courses in plumbing have been conducted. During the past year both Ohio and Pennsylvania have organized apprentice commissions in the plumbing industry, in both instances the initiative being taken by the state boards for vocational education.

The school for marble setters conducted by the state of Tennessee is carried on by the state board, under an agreement with employers and with the international union as well. The school has proven that the course has functioned efficiently in developing skilled workmen for the trade.

Trade Unions Seek Skilled Workmen. According to Mr. Lloyd Harrington, president of the Des Moines Typographical Union, organized labor has come to a realization of the value of schools in industry and views the knowledge received from schooling as most valuable in the making of good workmen.

Mr. Harrington points out that, just as schools have grown from the one-room school to large consolidated schools, so industry has come to see the need of work on a large scale. Consequently, a change in the system of training apprentices is needed.

At present there is a shortage of apprentices and journeymen, but to increase the apprentices under the old system would only make matters worse. The solution is the proper selection of applicants and encouragement and assistance to enable them to complete their training for competent craftsmen.

In this direction, the typographical union has established a bureau of education which works in cooperation with the school officials of the country. The union offers to schools a plan of instruction in printing which is based upon years of study of the problem of education for tradesmen. Previously it was difficult for educators and representatives of the printing trades to come to a clear understanding of the situation. Now the schools with the help of the union, can give courses in the art and aid in the making of expert printers.

Courses for Apprentices. The high school at Sacramento, Calif., has opened extension courses for apprentices in sheet metal work, electricity, paper hanging, painting, and machine shop work. The high school vocational teachers act as instructors for these appren-

Every Manual Training Class Room *should have this Complete Set of* IRWIN BITS

THIS set of genuine Irwin Auger Bits, ranging in 16ths of an inch, from one-quarter inch to one inch, is deserving of a place in every well equipped manual training or industrial arts workshop.

The thirteen auger bits comprising the set are all Irwin Mainbor Bits, made with the solid-center principle originated by Irwin 41 years ago.

Kept intact in the original container—Borcase or Borkit—they will remain in perfect condition indefinitely.

Write to us, mentioning this advertisement, and we will be glad to give you details regarding special introductory offer.

Write for the facts today.

THE IRWIN AUGER BIT COMPANY
Wilmington, Ohio.

"Largest Makers of Wood-Boring Tools in the World."

IRWIN *Auger Bits*

Train Them in Economical Production

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KLUGE FEEDER

attached to

Chandler & Price Press

Student printers should be taught to take advantage of every factor which makes for increased production at lower cost.

In the job printing business the best assistant they can have is a Kluge feeder. It is simple and efficient in operation and almost human in action.

Write us for further information.

Brandtjen & Kluge, Inc.

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New York, Chicago, St. Louis, Detroit.

12x18 Kluge Craftsman Efficiency Unit

tices, with the exception of paper hanging and painting. These courses are not a part of the curriculum and an outside instructor has been employed.

Vocational Courses Offered. The vocational department of the high school at Sacramento, Calif., represents an intensive development covering a period of three years. The courses which are intended for boys mechanically-minded, who take little interest in the ordinary school subjects, embrace such subjects as automobile mechanics, carpentry, electricity, machine shop work, sheet metal work, and printing. Supplemental work which relates to the industrial studies is required.

Boys Build Garage. The boys of the Essex County Vocational School, Newark, N. J., recently erected a garage for the school nurses' cars. The work was done by the classes in bricklaying and carpentry and represented a fine piece of good construction.

Trade School Boys Decorate Room. Students at Bridgeport, Conn., recently put what they learned in the trade school into practice when they decorated the Red Cross chapter headquarters, painting the woodwork, calcimining the walls, stenciling the borders, etc. The girls made 100 Red Cross flags to be used during roll call week.

Organize Kansas Association. A Kansas Vocational Association, to be affiliated with the American Vocational Association, has been organized this year. Mr. E. H. Teagarden, of Nickerson, is president, and Mr. E. G. Barber, of Salina, is secretary-treasurer.

Study Blue Print Reading. The railway apprentices of the Missouri-Kansas railroad at Parsons, Kans., are studying blue print reading and shop sketching.

Electrical Class. An evening class for electrical maintenance men has been established at Arkansas City, Kans., under the direction of Mr. C. L. Holman.

Evening Classes Popular. Mr. W. N. Van Slyck of Salina, Kans., reports that evening school education has proven popular. The printing class includes several apprentices from the local shops who are studying the I. T. U. lessons. One boy is taking a correspondence course in display advertising, sharing the work with other members of the class.

Industrial Arts Teachers Organize. At a meeting of the Industrial Arts men of Kansas, at Hutchinson, an organization known as the Kansas Industrial Arts and Vocational Association was formed, with Mr. J. B. Yingling, of Wichita, as president, and Mr. Harry McGinnis, of Coffeyville, as secretary-treasurer.

Smith-Hughes Trade Classes. A number of Smith-Hughes trade classes have been formed at the Kansas State Teachers' College, Pittsburgh, Kans. Among the subjects offered are engineering materials, steam power, mathematics, graphic statics, electricity, and mining.

Extension Classes Formed. Twenty-five classes in extension work, under the direction of seventeen instructors, have been opened in twelve different cities and towns in Kansas. Some of the classes meet every two weeks. The total enrollment of the classes is 400.

Pictorial Charts for Agricultural Teachers. The U. S. Department of Agriculture has gathered a number of photographs of plants and animals in various stages of development, which it has issued in the form of printed charts for the use of teachers in illustrating classroom work in agriculture and home economics. An arrangement with the Superintendent of Documents in the Government Printing Office makes it possible to obtain any one of the 32 charts at the small price of one cent each. Among the topics covered in the charts are breeds of horses, breeds of chickens, cotton producing areas, ginning and marketing cotton, production of small grain, harvesting of grain, corn and corn plants.

Cooperative Industrial Course. The Union High School at Fort Bragg, California, has developed a cooperative industrial plan of vocational education for high school students, in cooperation with the local industries and the state vocational board.

The program which is varied in scope, embraces such subjects as electrical shop practice, machine shop practice, office practice in banking, forestry work, railroad machine shop work, cabinet making, pattern making, power engineering, civil engineering, automobile mechanics, general mercantile work, laundry work, lumbering, and printing.

Under the arrangement, each department is in charge of a regular certificated man, who acts as instructor for the department. The students pursue their academic and shop work on alternate schedules. In addition to the credits received for the training work, each student is given a small scholarship from the industries as a special form of merit.

Student Counsel for Men. A comprehensive plan of counselling has been organized at Stout Institute, Menomonie, Wis., with the beginning of the first four-year group in September. The

(Continued on Page 36a)

THE TEST OF PRINTING

The Conclusions of Prominent Educators

William J. Bogan, Assistant Superintendent of Schools of the Department of Education, Chicago, writes: "Through its strong appeal to boys, the printing course has acquired great importance in the Junior High School. The practical value of printing is great, for aside from its trade features, it appeals alike to the artist, the advertiser, the editor, the reporter, the business man, the author."

Emma V. Tindal, Principal of the Oliver Wendell Holmes Junior High School, Philadelphia, Pa., writes: "To my mind, printing is an educational agency of undoubted value. When included in a school curriculum, it may be employed to motivate instruction in various studies, such as punctuation, composition, grammar, spelling, mathematics, science, and art. And it will also afford an opportunity for acquired and worth-while manual skill."

Susan Dorsey, Superintendent of Schools, Los Angeles, California, writes: "It is a matter of importance that through the school printshop a large number of young people have become familiar with the different styles of type, with the setting up of forms, and with the vocabulary of printing, and the related arts of making cuts, prints and the like."

James M. Glass, Director of Junior High Schools, Commonwealth of Pennsylvania, writes: "Printing is incorporated into Junior High School program of studies in a majority of instances as part of a general shop organization. The aim is not vocational education, but general industrial arts training. Where the try-out purposes of a general shop need not be restricted to the industrial activities of a given community it seems advisable to add printing as one of the projects of a general shop plan."

FOR INFORMATION REGARDING PRINTING INSTALLATIONS, WRITE

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(Concluded from Page 34a)

first part of the plan is in operation this year for freshmen students. Next year the plan will be extended to men in the sophomore class, and this development will continue until the plan is in operation for students in all four years.

Appropriation for Art School. The board of school estimate of Newark, N. J., has authorized an appropriation of $850,000 for the construction of the Fawcett School of Industrial Arts. The building will contain 45 classrooms, an auditorium, a lecture room, a library, and an office.

Continuation School Makes Christmas Toys. The pupils of the continuation school at Lancaster, Pa., during the holiday season, completed a varied assortment of toys which were distributed among the indigent children of the city. The toys were well constructed and painted in bright colors.

The continuation school has an enrollment of 210 boys, who spend an hour and a quarter each week in the shops. The boys divide into two groups, the younger boys working in the wood shop under the direction of Mr. William Brock, and the older boys doing their work in the machine and sheet metal shop at the West End High School which is in charge of Mr. George McLaughlin.

In the wood shop a new method of instruction was tried out the past term, with such success that Mr. W. E. Brunton, the supervisor, plans to continue the experiment. The work has been put on the production basis and each pupil will make certain parts of the problem. Formerly each pupil made the entire bench or table from start to finish. To avoid monotony on the job, and to give the boy experience in making the parts, the jobs are rotated every week or so. The plan has been entirely successful.

Girls Make Trousseau. Students in the Girls' Vocational School at Baltimore, Md., during the fall were given a share in the making of a trousseau. The advanced class made the bridal gown of delft-blue crepe Elizabeth. They made the traveling dress of jungle-green crepe roma, combined with velvet. The hemstitching for the slips to go with the several dresses was done by the girls with experience in operating the hemstitcher. The Vocational School is housed in new quarters this year.

Practical Business Course for High School Students. Mr. H. A. Fuge, of West Bend, Wis., writing in the "Hardware Age," describes the operation of the hardware class in his store and the advantages to be gained from this plan. The high school has a business course, and each year the entire class works as clerks in the hardware store on Fridays and Saturdays during the month of December. Last year there were 25 in the class—15 girls and 10 boys. The main purpose was to cooperate with the school officials in furnishing practical experience in business. Incidentally, the pupils gained a better understanding of the hardware business, with its problems and ramifications.

During the week preceding the advent of the students in the store, an hour's talk is given each day by various factory representatives and other authorities on hardware merchandising, overhead costs, and similar subjects. In the store, the class works under the supervision of the regular clerks, and the pupils not only wait upon customers, but they trim windows and arrange store displays.

In the past, the class has been paid a straight commission of ten per cent on all sales made by the members, and last year the total sum amounted to nearly $100, which was spent for a painting for the high school. This year, instead of paying the entire ten per cent commission to the class, arrangements were made to pay only five per cent to the class and the balance to the individual students. This plan gives an added incentive to each one to exercise his sales ability and incidentally make more sales.

The store where the students are instructed in hardware merchandising is a fine example of modern store arrangement, with display tables for the kitchenware and the smaller items all mounted on sample boards. The plan has gained the cooperation and enthusiasm of the teachers, who come to the store with the class and are of active assistance in instructing pupils on practical store methods.

Building Trades School. The building trades school in Cincinnati offers specialized training for boys desiring to enter one of the building trades. Instruction is given in carpentry, plumbing, brick-laying, sheet metal work, and cabinet-making. The course is two years in length, but boys are placed in positions when 16 years of age, if urged by the parents. Cooperative positions are provided in related lines where apprentice agreements may not be made before the age of 16. One-half the time is given to actual shop work, and the remainder to such subjects as are related to the particular trade.

Vocational Teachers to Suggest Textbooks. The teachers in the vocational schools of Cincinnati have begun a study of available text and reference books which may be recommended to the superintendent for adoption and use during the next five years.

The work has been undertaken by a group of 70 teachers, divided into committees according to subjects, and working under the direction of Dr. W. W. Patty of Ohio University. The work of inspecting the various books was begun in January, 1927, and it is expected the work will be completed by April first.

NEW BOOKS

A Guide to Woodworking Projects

By P. V. Woolley. Cloth, 96 pages. Price, $1. Manual Arts Press, Peoria, Ill.

Modern educational requirements in schools demand that there be storehouses of information in order that the instructor may know where to locate information when wanted.

The present book is of great help to the shop teacher in search of projects for it enables him to locate in a few minutes the working drawing and description of any one of more than 1,500 woodworking projects. It is an index of the contents of 118 books.

The projects listed are classified into major groups, such as baskets, benches, birdhouses, chests, and tables. There are 72 different kinds of tables, 53 kinds of chairs, 35 kinds of stands, 25 kinds of dye materials, 19 kinds of guns, and 12 kinds of puzzles.

From the standpoint of popularity with authors, the taboret heads the list with 63 references, and footstools and wren houses come next with 48 references.

Wallpaper and Wallpaper Hanging

By Charles L. Young. Cloth, 293 pages. Price $5. The Century Co., New York City.

This is the second of a series of books by the author, who has been actively engaged in the wallpaper and painting business for the last 25 years. It is intended as a handbook of information for those engaged in any branch of the wallpaper business, and it serves both as a practical textbook for vocational schools and industrial classes offering such courses, and as a comprehensive manual for those actively engaged in the trade.

The book covers systematically and clearly, every phase of the paper hanging business, from advertising and selling, to estimating costs, selecting the right paper, and doing the job correctly and economically. A feature of the book is a chapter devoted to paneling as well as wallpaper.

In the book the author lays great stress on the practical processes of the trade such as estimating wall surface, tools, and equipment, preparation of walls, and the hanging of wall coverings on different kinds of walls to meet a variety of conditions.

The book should be of considerable help in vocational schools and industrial classes where courses in paperhanging are offered. The book is illustrated with 34 figures and 41 halftone plates and contains a number of job sheets for carrying out the different operations in the work.

Ancient Egyptian Materials

By A. Lucas. Cloth, 242 pages. Price, $2.75. Longmans, Green & Co., New York, N. Y.

It is only in recent years that the chemist has been consulted by the archaeologist and given an opportunity of examining an antique piece.

The present book offers a number of problems in Egyptology that chemistry alone can solve, together with a description of each material, its nature and composition, its use, its place of origin, and the date when it was first employed. The information regarding the nature and composition of the materials has been obtained from a personal examination and analysis whenever possible, and the dating of the materials has been taken from archaeological reports and museum catalogs.

Among the materials listed and described are building materials, metals, glass and pottery, pigments and varnishes, precious and semi-precious stones, textiles, leather and dyes, writing materials, and miscellaneous materials including bone, charcoal, emery, graphite, ivory, horn, jade, shells, and tortoise shell.

Teachers who are interested in the history of materials used in modern industry will find a great many interesting as well as valuable facts for use in teaching related information.

Shoe Repairing

By Paul E. Klein. Cloth bound, 110 pages. Published by the Bruce Publishing Co., Milwaukee, Wis.

The author saw the demand for a textbook on shoe repairing, and he has filled that demand. The present volume deals with every phase of shoe repairing, from the common types of shoe construction, to the equipment and tools employed.

The book is divided into thirteen chapters. The first two treat of the various makes of soles—stitch, nail, welt—and the leathers usually employed by the shoe repairman. Four chapters are devoted to methods of re-soling the various types of shoes. Lessons in wax-end sewing then follow. One chapter is devoted to heels—leather, rubber, and wood. The sewing of rips and patches is thoroughly taught. Miscellaneous repairs also come in for consideration. The book is well illustrated throughout.

The Art of Brass Repousse

By T. G. and W. E. Gawthorp. Paper cover, 88 pages. Published by B. T. Batsford, Ltd., London, England. Imported by The Bruce Publishing Co., Milwaukee, Wis.

The student who desires to engage in fashioning brass and iron into quaint ornaments will find here an instructive textbook. The authors by word and picture carry the student into the mysteries of

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PUBLICATIONS RECEIVED

A Suggestive Course of Study in Manual Arts for North Dakota. By Carl V. Lindeman, assisted by H. D. Schultz. Issued by the North Dakota Normal and Industrial School, Ellendale, N. D. The author believes that the underlying principles of manual training are sound and necessary to any adequate scheme of education, but that there must be an everchanging consideration, if it is to meet the needs of the times. The present courses include woodworking, mechanical drawing, home mechanics, and wood-turning. Each course contains suggestive problems, tool processes, tools required, and general equipment adapted for the shop. There is a list of references containing books and pamphlets on the manual arts.

Handy Books. First Edition, August, 1926. A list of publications relating to a variety of subjects, which may be had from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Elementary Machine Shop Practice. Cloth, 118 pages. Prepared by the Committee on Industrial Education and issued by the National Metal Trades Association at its national headquarters, Chicago, Ill. The book is not intended as an exhaustive treatise but is to be used in the shop where the instructor can demonstrate on the actual machine. In the book, lathe work and planer work have received the most attention since they are fundamental for all other machine operations. Other subjects taken up are drilling machines and drilling, milling machine work, and bench and vise work.

Tenth Annual Industrial Art Exhibition. The Metropolitan Museum of Art held its tenth annual exhibition of industrial art December 4 to January 5, in New York City. The museum has constantly sought to meet the growing public interest in the art industries, and has added new objects and introduced certain important requirements with the purpose of displaying all objects designed and made in the United States. With the aid of cooperating firms and designers, the museum displayed examples of original designs in ceramics and glassware, furniture, lace, metal work, hardware and lighting fixtures, rugs, silver and goldsmith's work, textiles, and wallpaper.

PERSONAL NEWS NOTES

Mr. Earl Baird has been appointed as a teacher-trainer for the state vocational department of Kansas. Mr. Baird will work in cooperation with Mr. J. V. Lynn in covering the state in foremen training as previously, and in addition will carry on Smith-Hughes teacher-training in isolated centers previously handled by Prof. Lynn. Mr. Baird will also devote some time to the trade and industry department of the Iowa State College.

Mr. A. L. Guy, supervisor of manual training at Kansas City, Kans., has been appointed director of the vocational evening classes for the men of Kansas City.

Mr. Wade Masters has been appointed as instructor in architectural drawing in the evening school at New Kensington, Pa.

Mr. H. J. Moore, formerly instructor in English at the Boys' Vocational School, Newark, N. J., has resigned to become a traveling salesman for a New York book publishing firm.

Mr. Harry J. Wilson, of Hornell, N. Y., has been appointed director of vocational, continuation, and night schools at Watertown. Mr. Wilson has introduced a program of vocational work for the seventh and eighth grades and will gradually extend the work to embrace automobile mechanics and carpentry in the high school. Three new courses have been introduced during the past year, one in the high school, and two in the grades.

Mr. H. C. Houchens has been elected president, and **Mr. W. L. England,** secretary-treasurer, of the new Virginia Vocational Society recently organized at Richmond.

Mr. A. W. Gaffron, 58, a manual training instructor in the Harding Junior High School, Oklahoma City, Okla., died in that city following an attack of heart disease. Mr. Gaffron came to Oklahoma City seven years ago as an instructor in the Classen High School. He leaves a widow, also several brothers and sisters in St. Louis.

Mr. C. H. McConnel of Montoursville, Pa., has been elected supervisor of vocational education in Lycoming County.

Mr. L. J. Lease has been appointed director of vocational education in the high school, Granite City, Ill. Mr. Lease recently gave a talk before the Rotary Club of the city, in which he pointed out the benefits to be derived from a close cooperation of the vocational school with the industries of the community. He emphasized that under a cooperative agreement, boys and young men may be trained efficiently for entrance into the industries, and he cited cities where this plan had worked to good advantage.

New Vocational High School. The Minneapolis school board has taken steps toward the erection of a vocational high school to cover an entire city block, and to cost approximately $1,600,000. Work will be started next spring on the first unit of the structure, which will cost about $800,000.